



Home Run Hitters

Adventures with numbers

Home Run Hitters (1953)--Part 1 of 2

Why HOME RUN HITTERS makes your ...

teaching MORE EFFECTIVE and produces BETTER RESULTS in your arithmetic classroom

The teaching program in Home Run Hitters was tested and proven in actual school classrooms before publication. Both authors, Doctor Jesse Osborn and Adeline Riefeling, are engaged in teaching children. They devoted fourteen years to the preparation and testing of every element present in this program. The features you get will make your own instruction more effective, easier to administer and more pleasant for everyone.

THE LEARNING PROGRAM — Presentation, practice, re-teaching, and review. There is a very definite, simple, psychologically sound pattern followed in presenting all material in Home Run Hitters.

	Example
1st The antecedent process is reviewed	pp. 44-46
2nd The new process is introduced	p. 47
3rd It is followed immediately with practice involving the new skill	pp. 47-49
4th The process is then re-taught	p. 77
5th More practice follows	pp. 78-81
6th It is maintained and reviewed from that time forward	pp. 96-102

In Home Run Hitters no process is ever introduced, then dropped, or taught but not practiced.

TESTING AND SPECIAL ASSISTANCE WORK — Every unit of work in Home Run Hitters closes with first, a diagnostic test (for example, page 109). Pupils revealing a need for remedial work in the diagnostic test will find this provided on the next page (page 110). For pupils of superior achievement there is a page of more difficult material (page 111). New processes are never introduced on this page. Then, for your final measure, an achievement test completes the unit (page 112).

PRACTICE — Home Run Hitters gives you 6049 separate practice problems.

MEANINGFUL ARITHMETIC CHILDREN UNDERSTAND — All skills and processes in Home Run Hitters are explained in terms meaningful to

twelve year olds. This is possible because extensive classroom tests revealed clearly just what children at this level could understand and what they couldn't. Meanings too difficult for seventh grade youngsters have been excluded from Home Run Hitters.

A PROGRAM CHILDREN ENJOY — Home Run Hitters presents arithmetic that children really enjoy. Explanations as well as problem content are all based upon things that interest twelve year old children. The computational needs of seventh grade children form the material used in problem solving (glance over pages 61, 71, 113, 131).

In addition, interest-building devices used for years to add sparkle to basic readers brighten your arithmetic program for the first time. The baseball theme, which all seventh graders love, gives continuity and interest to your testing and special assistance pages. It gives this text its name. It is not used often enough, however, to lose its motivating force. Special games, races and group activities add life and sparkle to practice and daily work.

ARITHMETIC CHILDREN CAN READ — Too often learning in arithmetic is impeded by too difficult reading material. This problem has been eliminated in Home Run Hitters. All elements contributing to reading difficulty have been rigidly controlled. So successfully has this been done that Home Run Hitters measures only 5.7 when tested with the Lorge Readability Index Formula.

COLOR THAT HELPS YOU TEACH — Color is used in Home Run Hitters not only to make it the most attractive seventh grade arithmetic text, but more important, to help you teach. You find examples of new skills spotlighted in red, the important elements in a new process set out in color. As one child put it, "The red print tells me to stop, look, and listen."

TYPE THAT'S EASIER TO READ — Both Home Run Hitters and the famous Snellen Eye Chart are set in the same type. Its superiority has been proven by extensive laboratory tests. Dr. Matthew Luckiesh, famous vision expert, found, by test, that numbers used in Home Run Hitters are 50% more readable than those in the other arithmetics tested and the running words 20% more readable. This feature will greatly reduce eye strain and errors caused by faulty identification.

HOME RUN HITTERS • Grade 7

List price ~~\$4.95~~ (Subject to usual school discount). Available also are teacher's manuals, answer books and workbooks.

WEBSTER PUBLISHING COMPANY • St. Louis Dallas Pasadena



Home Run Hitters



Adventures with numbers

IN ORDER OF INCREASING DIFFICULTY

BUSY BEAVERS

RANGE RIDERS

STRAIGHT SHOOTERS

AIRPLANE ACES

HOME RUN HITTERS

CAGE CHAMPIONS

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★ Preface

Plan of Series. Adventures with Numbers is unique in organization. Each book has a motif taken from the pupils' world and captivating to the pupil. The motif furnishes the book's title. Young learners assume the role of Busy Beavers or Range Riders as they experience adventures with numbers. The boy or girl who is a little older plays that he is on the rifle range or piloting a plane as he gains further skill and understanding. The upper grade pupil takes part in a make-believe ball game, the rules and the scores of which provide motivation and sliding measures of achievement. Emphasis is placed on crediting the pupil with what he does correctly, without undermining his confidence when he fails to make a perfect total score, or the hypothetical 100%.

Unit Organization. Each book is divided into twelve units, each unit a little book in itself, with presentation of new material, practice in computation, and helps in problem solving. Pages of races, drills, and problems, with like captions and illustrations, occur in each unit of a book. The four closing pages of a unit are:

- a. Test on material of unit, with a goal.
- b. Helps for those who failed to reach goal a.
- c. Challenges for those who did reach goal a.
- d. Final unit test, geared to average pupil.

The first and seventh units of each book are given largely to reviewing and reteaching. Thus, twice a year, there are systematic campaigns to strengthen foundations so that the pupil can go into new work with new confidence, even though there have been gaps in his earlier work.

Non-Discriminating Differentials. Careful provisions are made for pupils with different learning rates. This is done in such a way as not to foster a superior attitude on the part of the fast learner nor to embarrass the one who learns slowly. Among the beavers, one who mends the wall can take as much pride in his work as the one who builds it higher. In basketball, one who recovers the ball is as valuable to the team as one who passes the ball. There is no higher nor lower with the pupil who does his best with the work that is appropriate for him. In Adventures with Numbers, there is differentiation without discrimination.

Individualized Program. Directions are addressed to pupils. Pupils are asked to choose partners, or to divide into groups or teams to do specific tasks.

They mark each other's papers and go on to the next task. This builds up a feeling of responsibility on the part of the pupil, and helps to release the teacher from constant direction of the class so that she can give help where it is most needed. The range between the slow learner and the fast learner in the average class is great. This series provides material and a plan so that the teacher can guide each pupil along at his own rate, rather than merely "covering" the material judged appropriate for the average pupil.

Readiness. Experience and experiments show that pupils do not become ready of themselves. We also know that teaching is wasted when the pupil is not ready. A program of preparing the pupil for each next step is skillfully woven into *Adventures with Numbers*. The «times-and» facts precede carrying in multiplication; station numbers precede uneven division. A boy's bicycle repair shop grows into a partnership and into a small corporation before stocks and bonds are presented. No process or idea is introduced until the pupil has been conditioned for it.

Presentation of New Concepts. Meanings, skills, and processes that are most difficult for the child to grasp are usually the ones that are most difficult to present clearly in a text. An author is tempted to be satisfied with something that he knows is inadequate, and to hope that teacher and pupil can fill in what is lacking. In *Adventures with Numbers*, no effort has been spared to present each new idea clearly and adequately. A pupil is not stopped today by the height of the ultimate goal in arithmetic, but by some little point in today's lesson that is not clear to him. Our presentations make the steps short and leave no gaps.

Using Arithmetic. A pupil may excel in book computation or book problems, and fail to see that the purpose of what he learns in school is to help him outside of school. He fails to carry what he learns in the little world within the school to the big world on the outside. *Adventures with Numbers* guides the pupil to the use of arithmetic in his everyday affairs, and helps him see arithmetic as a part of his whole self and not just a part of his school self.

Importance of Arithmetic. Quantitative thinking plays a more decisive role in our age than ever before. This is an age of number, measurement, science, and technology. The pupil who leaves school deficient in arithmetic is blocked from entering many fields. He will be handicapped in his efforts to earn a good living, or to buy most with what he does earn. For the individual who will carry his load and for the nation, arithmetic is truly an important part of the education for survival.

★★★★★★ Contents

Unit I. Pages 1-34

Estimating and counting. Reading and writing numbers of twelve figures. Roman numerals. Adding, subtracting, multiplying, and dividing with whole numbers, fractions, and mixed numbers. Developing problem solving.

Unit II. Pages 35-60

Working with decimals and per cents. Changing decimals to common fractions and to per cents, and the reverse. Developing problem solving.

Unit III. Pages 61-86

Terms and applications of percentage: margin, net profit, gain and loss, discount, commission, etc. Percentage formulas. Developing problem solving.

Unit IV. Pages 87-112

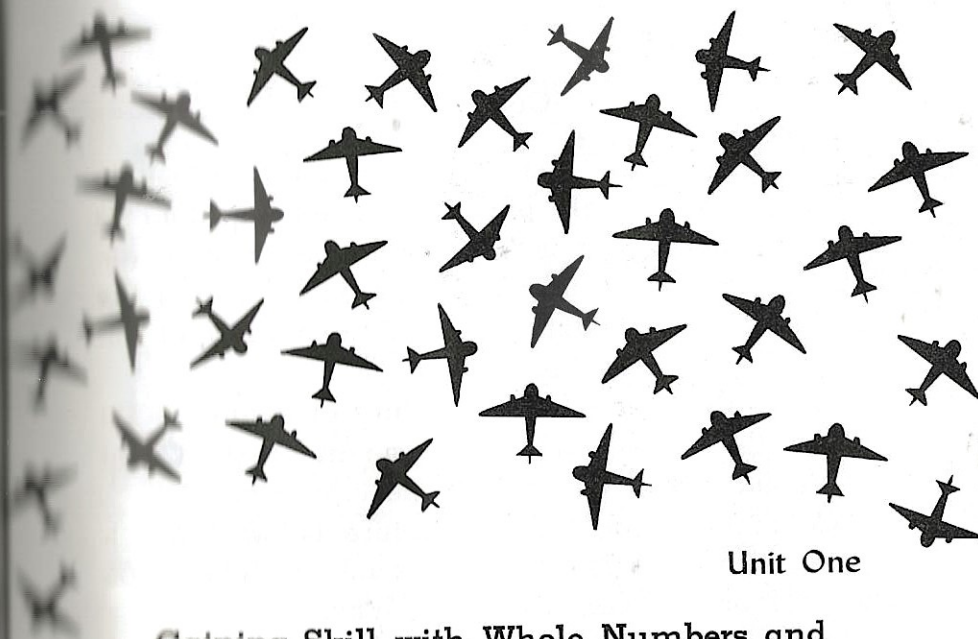
Rounding numbers and estimating answers, using whole numbers, fractions, and decimals. Further uses of percentage, including interest. Developing problem solving.

Unit V. Pages 113-138

Banking. Time between dates. Interest. Graphs and scale drawing. Developing problem solving.

Unit VI. Pages 139-168

Budgets and accounts. Problems in home mathematics. Developing problem solving.



Unit One

Gaining Skill with Whole Numbers and Fractions

A junior high boy constructed a model air field and placed a number of model planes on it. He asked another boy to look quickly and estimate the number of planes on the field. The picture shows what the boy saw.

Take a quick look and estimate the number of planes. Compare the estimates made by various members of the class.

Explain the difference between **estimating** and actually **counting**.

Estimate the length and width of the picture above. Check your estimates by measuring.

Estimate the lengths of several lines in the classroom. Check your estimates by measuring.

Counting

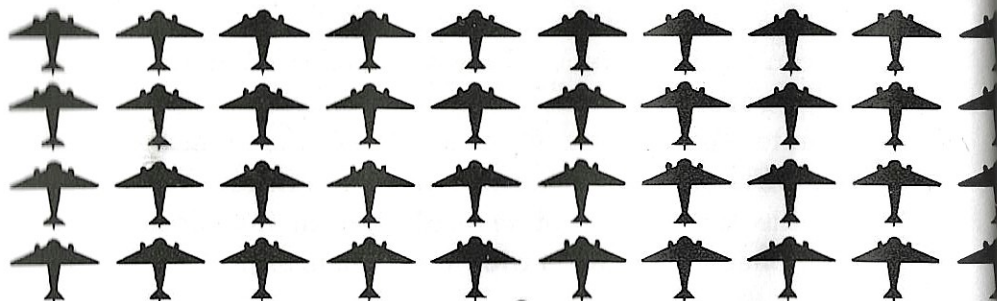
Can you count? Is that a strange question to ask a junior high pupil? Correct counting is very important. It is the foundation stone of accuracy in arithmetic. What would happen if the grocer did not count correctly? The railroad engineer? Your teacher? You?

Count the planes in the picture on page 1. Do all in the class count the same number? Count a second time. Can the whole class agree?

Count the planes in the picture below. Which group of planes is easier to count, the planes on page 1 or the planes below? Why?

How many times does the letter "a" occur on this page, outside the box? How many times does the letter "a" occur inside the box? Why is it easier to count the letters in the box?

aaaa aaaa aaaa aaaa
aaaa aaaa aaaa aaaa
aaaa aaaa aaaa aaaa
aaaa aaaa aaaa aaaa



Our Numbers and Roman Numerals

1. Explain why the figure 2 stands for different values in the numbers below.

2 (ones) 2,000 (thousands)
20 (tens) 2,000,000 (millions)
200 (hundreds) 2,000,000,000 (billions)

Read the numbers below.

2. 8 9,814 7,847,986 8,642,918,620
3. 26 48,573 97,162,417 53,812,791,884
4. 437 291,947 841,416,384 684,972,420,609

5. Bring to class five large numbers copied from newspapers or magazines. Read each number.

We use only ten figures, yet we are able to write any number, because the same figure can stand for many different values.

The Romans used seven letters in writing their numbers.

I	V	X	L	C	D	M
1	5	10	50	100	500	1,000

Read these Roman numerals and explain the principle used in each row.

6. II (I + I) III XX XXX MM
7. VI (V + I) VII XI XII DC
8. IV (V - I) IX XL CD CM
9. XIV (X + IV) XIX MIX MCM MC

Write these numbers in our figures and with Roman numerals.

10. One thousand four hundred ninety-two
11. One thousand nine hundred fifty

Things You Know About Addition

1. Mr. Smith bought gasoline three times on an automobile trip. He bought 12 gal., then 14 gal., and then 11 gal. How many gallons did he buy in all?

Addition is used to find the total or combined value of two or more numbers.

What are the numbers that are added called?

What is the answer called?

2. Add each number in Row B to every number in Row A. Say the sums quickly.

Row A	3	6	5	8	0	2	4	1	7	9
Row B	4	0	1	7	5	6	8	9	3	2

3. If you made any mistakes in Example 2, practice the 100 addition facts on page 325.

Say these sums quickly. No pencil, please.

$$\begin{array}{r} 4 \\ 3 \end{array} \quad \begin{array}{r} 24 \\ 3 \end{array} \quad \begin{array}{r} 44 \\ 3 \end{array} \quad \begin{array}{r} 74 \\ 3 \end{array} \quad \begin{array}{r} 54 \\ 3 \end{array} \quad \begin{array}{r} 34 \\ 3 \end{array} \quad \begin{array}{r} 84 \\ 3 \end{array} \quad \begin{array}{r} 14 \\ 3 \end{array}$$

$$\begin{array}{r} 5 \\ 9 \end{array} \quad \begin{array}{r} 15 \\ 8 \end{array} \quad \begin{array}{r} 95 \\ 6 \end{array} \quad \begin{array}{r} 35 \\ 4 \end{array} \quad \begin{array}{r} 65 \\ 5 \end{array} \quad \begin{array}{r} 85 \\ 2 \end{array} \quad \begin{array}{r} 45 \\ 7 \end{array} \quad \begin{array}{r} 55 \\ 8 \end{array}$$

6. The practice on page 326 will help you with the work on page 5.

Testing Your Addition

Choose a partner. One of you will work Sections I and IV while the other does Sections II and III. When both have finished, exchange papers and check for each other. The goal is two perfect sections for each of you.

Section I

6	3	2	6	3	58	27	23	37
9	6	5	2	9	49	88	74	36
4	7	9	9	5	63	54	89	76
5	3	4	2	3	71	28	72	85

Section II

372	4558	927	6986	7844	9695	4219
276	7444	365	4356	9135	6375	844
159	6447	768	7956	8768	6648	39
568	8999	914	9757	3754	7325	6643

Section III

8	9	6	7	5	34	38	74	52
9	2	5	4	7	83	73	49	85
7	5	9	6	4	56	37	84	97
5	6	3	7	8	49	26	94	83
2	5	8	9	4	37	29	56	69

Section IV

564	8372	139	2465	8278	2931	7386
155	3064	645	7498	3196	4985	735
295	4179	867	7284	3967	4579	9980
539	8996	748	7185	4293	8369	867
849	9986	976	4862	5973	3647	1359

Three Uses of Subtraction

Subtraction is used for any of these purposes:

A. To find how many are left after a smaller number has been taken from a larger number.

Mrs. Jones baked 250 cookies. How many are left after she has used 173 of them?

B. To find how much larger, or smaller, one number is than another.

Mrs. Jones paid \$3.35 for sugar and \$1.68 for butter. How much more did the sugar cost?

C. To find how much must be added to a smaller number to make it equal to a larger number.

The tank in Mrs. Jones' car holds 17 gal. There are 6 gallons in the tank now. How many gallons need be added to fill it?

Tell which of the three uses of subtraction each of these problems illustrates; then solve.

1. When Mr. Jones began a long trip, his speedometer read 11,650, and when he returned it read 15,434. How many miles did he drive?

2. Mr. Jones expected to sell \$25,000 worth of goods. After one week, his sales totaled \$18,465. How much more must he sell to reach his goal?

3. Mr. Jones bought a new car for \$1,875, and was allowed \$795 for his old car. How much must he pay in cash?

4. Mr. Jones had \$3,105.86 in the bank, and withdrew \$285. How much was in the bank then?

Things You Know About Subtraction

1. John had \$24.06 in the bank, and took out \$4.50. How much was left in the bank?

Subtraction		Check by Adding
$\begin{array}{r} \$24.06 \\ - 4.50 \\ \hline \$19.56 \end{array}$	$\begin{array}{r} \text{minuend} \\ \text{subtrahend} \\ \text{difference or remainder} \end{array}$	$\begin{array}{r} \$ 4.50 \\ + 19.56 \\ \hline \$24.06 \end{array}$

2. Jerry had \$53.87 in the bank and withdrew \$11.25. How much did he have left in the bank?

3. Mr. Brown owed \$50. He gave a check for \$35.75 as part payment, and paid the difference in cash. How much did he pay in cash?

4. If you make mistakes in subtraction, practice the 100 subtraction facts on page 327.

Subtract quickly. No pencil, please.

5.	$\begin{array}{r} 5 \\ 4 \end{array}$	$\begin{array}{r} 25 \\ 4 \end{array}$	$\begin{array}{r} 45 \\ 5 \end{array}$	$\begin{array}{r} 55 \\ 7 \end{array}$	$\begin{array}{r} 35 \\ 6 \end{array}$	$\begin{array}{r} 85 \\ 3 \end{array}$	$\begin{array}{r} 15 \\ 8 \end{array}$	$\begin{array}{r} 95 \\ 9 \end{array}$
6.	$\begin{array}{r} 8 \\ 3 \end{array}$	$\begin{array}{r} 20 \\ 3 \end{array}$	$\begin{array}{r} 30 \\ 3 \end{array}$	$\begin{array}{r} 70 \\ 7 \end{array}$	$\begin{array}{r} 41 \\ 9 \end{array}$	$\begin{array}{r} 61 \\ 6 \end{array}$	$\begin{array}{r} 73 \\ 8 \end{array}$	$\begin{array}{r} 80 \\ 5 \end{array}$
7.	$\begin{array}{r} 3 \\ 0 \end{array}$	$\begin{array}{r} 53 \\ 8 \end{array}$	$\begin{array}{r} 73 \\ 2 \end{array}$	$\begin{array}{r} 84 \\ 4 \end{array}$	$\begin{array}{r} 74 \\ 5 \end{array}$	$\begin{array}{r} 62 \\ 8 \end{array}$	$\begin{array}{r} 92 \\ 5 \end{array}$	$\begin{array}{r} 76 \\ 3 \end{array}$

Write the remainders on folded paper.

8.	$\begin{array}{r} 454 \\ 230 \end{array}$	$\begin{array}{r} 707 \\ 520 \end{array}$	$\begin{array}{r} 600 \\ 500 \end{array}$	$\begin{array}{r} 1200 \\ 1045 \end{array}$	$\begin{array}{r} 3045 \\ 2950 \end{array}$	$\begin{array}{r} 9000 \\ 4007 \end{array}$	$\begin{array}{r} 5894 \\ 3000 \end{array}$
----	---	---	---	---	---	---	---

9. If you still make mistakes in subtraction, work on page 328. Work with a partner.

+	0	1	2	3	4	5	6	7	8	9	
0	0	1	2	3	4	5	6	7	8	9	-0
1	1	2	3	4	5	6	7	8	9	10	-1
2	2	3	4	5	6	7	8	9	10	11	-2
3	3	4	5	6	7	8	9	10	11	12	-3
4	4	5	6	7	8	9	10	11	12	13	-4
5	5	6	7	8	9	10	11	12	13	14	-5
6	6	7	8	9	10	11	12	13	14	15	-6
7	7	8	9	10	11	12	13	14	15	16	-7
8	8	9	10	11	12	13	14	15	16	17	-8
9	9	10	11	12	13	14	15	16	17	18	-9
	0	1	2	3	4	5	6	7	8	9	-

Addition and Subtraction Facts in a Table

As an addition table, the addends are in red at the left and above the rectangle. The sums are inside the rectangle.

The sum of 6 and 7 is across from red 6 and under red 7. Find the sum of 8 and 9.

As a subtraction table, the minuends are inside the rectangle, the subtrahends are in red at the right, and the remainders are in red below the rectangle.

To subtract 7 from 13, find 7 in red at the right and 13 opposite 7 and inside the rectangle. The remainder, 6, is under the 13.

Work with a partner. Try to give the answers before your partner can find them in the table.

Testing Your Subtraction

Find a partner. One will write the remainders for the odd sections while the other does the even sections. Exchange papers when you have finished. Check for each other.

Section I

473	545	673	462	894	705	480
<u>254</u>	<u>29</u>	<u>595</u>	<u>8</u>	<u>496</u>	<u>249</u>	<u>172</u>
500	408	730	559	890	837	594
<u>4</u>	<u>89</u>	<u>729</u>	<u>401</u>	<u>400</u>	<u>408</u>	<u>220</u>

Section II

7893	4967	7896	8743	6783	9705
<u>2584</u>	<u>1976</u>	<u>4007</u>	<u>985</u>	<u>85</u>	<u>3708</u>
6000	7004	1450	8009	3966	6090
<u>94</u>	<u>806</u>	<u>1250</u>	<u>992</u>	<u>2879</u>	<u>2099</u>

Section III

87,655	98,184	73,678	69,436	47,304
<u>49,867</u>	<u>9,768</u>	<u>65,388</u>	<u>40,049</u>	<u>38,307</u>
34,199	48,701	54,208	21,000	47,000
<u>28,245</u>	<u>13,007</u>	<u>44,350</u>	<u>14,009</u>	<u>27,091</u>

Section IV

89,007	53,102	83,010	37,104	50,005
<u>82,008</u>	<u>45,433</u>	<u>32,043</u>	<u>32,043</u>	<u>12,108</u>
50,100	73,143	60,542	81,101	76,005
<u>7,830</u>	<u>654</u>	<u>50,655</u>	<u>72,301</u>	<u>28,008</u>

Things You Know About Multiplication

1. Tom used 3 ft. of lumber in making each shelf for a bookcase. How many feet of lumber did he use in making four shelves?

Multiplication	Check	Addition
<i>Multiplicand</i> 3 ft.	4	3 ft.
<i>Multiplier</i> $\times 4$	$\times 3$	3
<i>Product</i> 12 ft.	12 ft.	3
		<u>3</u>
		12 ft.

Multiplication is a short form of addition. You use multiplication to find the total value of two or more equal numbers. You may check multiplication by changing the places of the multiplicand and multiplier and multiplying again, or by adding.

2. Multiply each number in Row A by every number in Row B. Say the product quickly.

Row A	6	8	3	0	2	7	9	1	5	4
Row B	4	3	5	2	8	9	1	7	6	0

3. If you made any mistakes in Example 2, do the work on page 329.

4. Multiply.

875	407	934	780	600	596	308	260
<u>8</u>	<u>9</u>	<u>42</u>	<u>76</u>	<u>94</u>	<u>704</u>	<u>639</u>	<u>803</u>

5. If you made mistakes in Example 4, do the work on page 330.

Testing Your Multiplication

While one partner does the odd sections the other will do the even. When both have finished, exchange papers and check. If any mistakes are made, help each other find them.

Section I

48	54	35	42	44	63	28	37	93
<u>6</u>	<u>8</u>	<u>7</u>	<u>5</u>	<u>9</u>	<u>4</u>	<u>7</u>	<u>9</u>	<u>4</u>
72	43	57	81	89	76	65	47	84
<u>38</u>	<u>45</u>	<u>72</u>	<u>78</u>	<u>54</u>	<u>83</u>	<u>91</u>	<u>57</u>	<u>89</u>

Section II

239	538	765	439	734	384	951
<u>7</u>	<u>9</u>	<u>6</u>	<u>8</u>	<u>9</u>	<u>7</u>	<u>6</u>
470	908	400	192	583	677	805
<u>28</u>	<u>70</u>	<u>90</u>	<u>83</u>	<u>38</u>	<u>45</u>	<u>76</u>

Section III

632	508	723	965	299	800	594
<u>470</u>	<u>380</u>	<u>900</u>	<u>407</u>	<u>948</u>	<u>689</u>	<u>413</u>
7694	7896	9768	8749	3978	9356	
<u>7</u>	<u>9</u>	<u>8</u>	<u>6</u>	<u>3</u>	<u>4</u>	

Section IV

9679	4387	6398	7644	6937	5767
<u>76</u>	<u>48</u>	<u>84</u>	<u>49</u>	<u>55</u>	<u>93</u>
8709	9960	4007	2700	5028	6000
<u>786</u>	<u>580</u>	<u>309</u>	<u>700</u>	<u>540</u>	<u>875</u>

Things You Know About Division

You make two uses of division.

A. To find how many times one number is contained in another number.

If 48 jars can be packed in one box, how many boxes are needed to pack 2,592 jars?

B. To find a part of a number.

John divided 192 marbles into 6 equal piles. How many marbles were in each pile?

1. Mr. Smith drove 360 mi. in 8 hr. What was the average number of miles he drove an hour?

	Division		Check
	45 mi. Quotient		
Divisor	8)360 mi. Dividend	45 mi.	
	32	x8	
	40	360 mi.	
	40		

2. If you make mistakes in division, practice the division facts on page 331.

Say quotients and remainders quickly.

3. $5\overline{)26}$ $6\overline{)35}$ $8\overline{)43}$ $4\overline{)39}$ $8\overline{)58}$ $9\overline{)48}$

4. $8\overline{)75}$ $4\overline{)31}$ $6\overline{)34}$ $9\overline{)67}$ $5\overline{)47}$ $7\overline{)53}$

5. $8\overline{)66}$ $7\overline{)59}$ $6\overline{)56}$ $8\overline{)45}$ $6\overline{)49}$ $7\overline{)64}$

6. The practice on pages 332 and 333 will help you with the problems on page 14.

×	0	1	2	3	4	5	6	7	8	9	
0	0	0	0	0	0	0	0	0	0	0	
1	0	1	2	3	4	5	6	7	8	9	÷1
2	0	2	4	6	8	10	12	14	16	18	÷2
3	0	3	6	9	12	15	18	21	24	27	÷3
4	0	4	8	12	16	20	24	28	32	36	÷4
5	0	5	10	15	20	25	30	35	40	45	÷5
6	0	6	12	18	24	30	36	42	48	54	÷6
7	0	7	14	21	28	35	42	49	56	63	÷7
8	0	8	16	24	32	40	48	56	64	72	÷8
9	0	9	18	27	36	45	54	63	72	81	÷9
	0	1	2	3	4	5	6	7	8	9	÷

Multiplication and Division Facts in a Table

The multipliers are in red at the left, the multiplicands are in red at the top, and the products are in the rectangle.

The product of 6 and 7 is across from 6 and under 7. Find the product of 8 and 9.

The dividends are in the rectangle, the divisors are in red at the right, and the quotients are in red below the rectangle.

To divide 42 by 7, find 7 in red at the right and 42 on the line with 7 and inside the rectangle. The quotient, 6, is in red under the 42. Divide 35 by 5 with the table.

Work with a partner as you did on page 8.

Testing Your Division

While one partner does the odd sections the other will do the even. Exchange and check papers for each other.

Divide. Mark papers after each section.

Section I

$$\begin{array}{ccccc} 9\overline{)783} & 7\overline{)644} & 8\overline{)512} & 6\overline{)504} & 4\overline{)384} \\ 7\overline{)382} & 8\overline{)771} & 9\overline{)567} & 3\overline{)287} & 6\overline{)593} \\ 9\overline{)5006} & 7\overline{)6394} & 4\overline{)5309} & 8\overline{)8900} & 6\overline{)7073} \end{array}$$

Section II

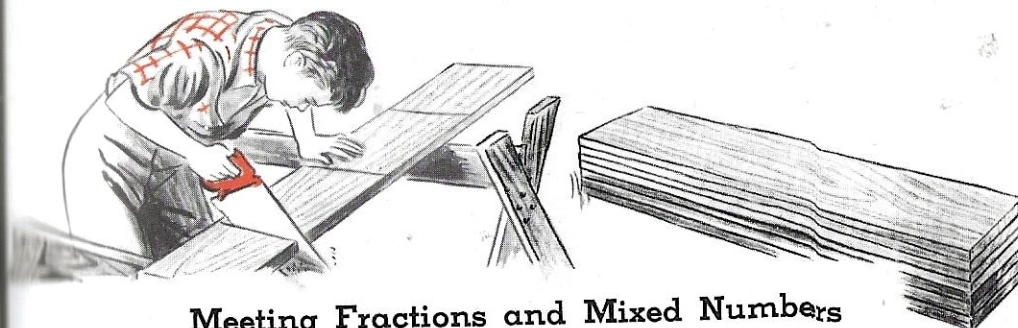
$$\begin{array}{cccc} 38\overline{)4576} & 27\overline{)3938} & 36\overline{)5332} & 49\overline{)8040} \\ 14\overline{)1282} & 17\overline{)2940} & 19\overline{)4541} & 18\overline{)2459} \\ 23\overline{)4964} & 34\overline{)5768} & 42\overline{)7784} & 51\overline{)8046} \end{array}$$

Section III

$$\begin{array}{cccc} 76\overline{)7372} & 21\overline{)4389} & 47\overline{)9776} & 67\overline{)4968} \\ 48\overline{)8443} & 57\overline{)9182} & 66\overline{)4831} & 79\overline{)8406} \\ 64\overline{)37861} & 73\overline{)55672} & 81\overline{)60042} & 92\overline{)77132} \end{array}$$

Section IV

$$\begin{array}{cccc} 68\overline{)54385} & 77\overline{)60482} & 86\overline{)59832} & 95\overline{)75579} \\ 378\overline{)58345} & 596\overline{)28406} & 845\overline{)93895} & 772\overline{)97557} \\ 618\overline{)60032} & 435\overline{)512504} & 932\overline{)384644} & 845\overline{)771567} \end{array}$$



Meeting Fractions and Mixed Numbers

Bill is cutting a board into 4 equal parts. What part of the board is each part?

Numbers that show parts are called fractions. The terms of a fraction are the $\frac{1}{4}$ **numerator** and the **denominator**. The denominator shows the number of equal parts into which the whole is divided. The numerator shows the number of parts taken. A fraction has three uses:

A. To show one or more of the equal parts into which one thing has been divided.

One part of Bill's board is $\frac{1}{4}$ of the whole.

B. To show one or more of the equal parts of a group.

$\frac{3}{7}$ of Bill's pile of boards are dark.

C. To find the ratio or compare one group with another.

The ratio of the dark boards to the light boards in Bill's pile is $\frac{3}{4}$.

In a **proper** fraction, the numerator is less than the denominator, as $\frac{1}{4}$, $\frac{3}{4}$, $\frac{3}{7}$, $\frac{4}{7}$.

In an **improper** fraction, the numerator is equal to or greater than the denominator, as $\frac{4}{4}$, $\frac{4}{3}$.

Changing the Form of Fractions

A fraction is in lowest terms, or in simplest form, when no number except 1 will divide evenly into both numerator and denominator.

1. Which of these fractions are in lowest terms?

$$\frac{12}{16} \quad \frac{6}{8} \quad \frac{3}{4} \quad \frac{4}{5} \quad \frac{8}{10} \quad \frac{5}{15} \quad \frac{1}{3} \quad \frac{3}{6} \quad \frac{6}{9}$$

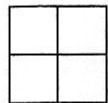
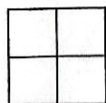
To reduce a fraction to lowest terms, divide the numerator and denominator by the largest number that can be divided evenly into both.

$$\frac{12 \div 4}{16 \div 4} = \frac{3}{4}$$

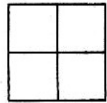
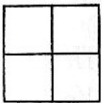
Reduce the following to lowest terms.

$$\begin{array}{llllllll} 2. & \frac{6}{8} & \frac{8}{10} & \frac{5}{15} & \frac{4}{6} & \frac{2}{6} & \frac{2}{8} & \frac{4}{8} & \frac{2}{10} \\ 3. & \frac{5}{10} & \frac{6}{10} & \frac{2}{4} & \frac{3}{9} & \frac{6}{9} & \frac{6}{12} & \frac{2}{12} & \frac{3}{12} \\ 4. & \frac{9}{12} & \frac{8}{12} & \frac{4}{12} & \frac{10}{12} & \frac{4}{16} & \frac{2}{16} & \frac{6}{16} & \frac{5}{20} \end{array}$$

There are 8 fourths in 2 wholes.



There are 9 fourths in $2\frac{1}{4}$ wholes.



Draw figures to show the following:

5. Halves in 2 wholes; in $2\frac{1}{2}$ wholes.
6. Thirds in 2 wholes; in $1\frac{2}{3}$ wholes.
7. Sixths in 2 wholes; in $1\frac{5}{6}$ wholes.

The numbers $2\frac{1}{2}$, $1\frac{2}{3}$, and $1\frac{5}{6}$ are mixed numbers. A **mixed number** is made up of a whole number and a fraction.

An improper fraction can be changed to a whole number or a mixed number by dividing its numerator by its denominator.

$$\frac{8}{4} = 4\overline{)8} = 2 \quad \frac{5}{3} = 3\overline{)5} = 1\frac{2}{3}$$

Change to whole or mixed numbers.

$$\begin{array}{llllllll} 8. & \frac{6}{4} & \frac{9}{6} & \frac{6}{2} & \frac{8}{6} & \frac{10}{4} & \frac{10}{8} & \frac{12}{8} & \frac{16}{8} \\ 9. & \frac{19}{6} & \frac{10}{5} & \frac{9}{2} & \frac{35}{8} & \frac{30}{4} & \frac{24}{5} & \frac{25}{6} & \frac{28}{6} \\ 10. & \frac{6}{2} & \frac{11}{4} & \frac{18}{6} & \frac{45}{8} & \frac{45}{6} & \frac{16}{5} & \frac{27}{4} & \frac{35}{6} \end{array}$$

A whole number may be changed to an improper fraction.

11. How many halves are there in 3? In 5?

12. How many fourths are there in 5? In 3?

A mixed number may be changed to an improper fraction.

$$3\frac{1}{2} = 3 + \frac{1}{2} = \frac{6}{2} + \frac{1}{2} = \frac{7}{2}, \text{ or}$$

$$3\frac{1}{2} = \frac{2 \times 3 + 1}{2} = \frac{7}{2}$$

Change to improper fractions.

$$\begin{array}{llllllll} 13. & 5\frac{1}{4} & 4\frac{5}{8} & 6\frac{3}{4} & 2\frac{1}{6} & 13\frac{1}{3} & 12\frac{1}{2} & 8\frac{1}{5} \\ 14. & 3\frac{3}{4} & 6\frac{4}{5} & 1\frac{2}{5} & 4\frac{1}{9} & 12\frac{5}{6} & 16\frac{2}{3} & 7\frac{1}{2} \\ 15. & 4\frac{5}{6} & 2\frac{3}{4} & 3\frac{1}{4} & 5\frac{1}{6} & 33\frac{1}{3} & 17\frac{1}{2} & 1\frac{7}{8} \end{array}$$

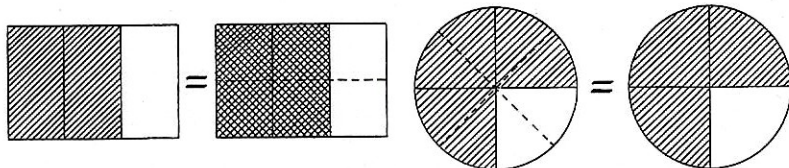
16. In visiting friends, Bob walked $\frac{1}{8}$ mi., then $\frac{3}{8}$ mi., and then $\frac{7}{8}$ mi. How many miles did he walk?

Fractions having the same denominator are called **like** fractions. The fractions $\frac{1}{8}$, $\frac{3}{8}$, and $\frac{7}{8}$ are like fractions. To add like fractions, you add their numerators. The denominator is not changed.

How would you subtract like fractions?

Addition

$$\begin{array}{r} \frac{1}{8} \\ + \frac{3}{8} \\ + \frac{7}{8} \\ \hline \frac{11}{8} = 1\frac{3}{8} \end{array}$$



$$\frac{2 \times 2}{3 \times 2} = \frac{4}{6}$$

$$\frac{6 \div 2}{8 \div 2} = \frac{3}{4}$$

Equivalent Fractions

Both numerator and denominator of a fraction may be multiplied or divided by a number without changing the value of the fraction. Two fractions of equal value are called **equivalent** fractions.

$\frac{2}{3}$ and $\frac{4}{6}$ are equivalent fractions.

$\frac{3}{4}$ and $\frac{6}{8}$ are equivalent fractions.

Supply the missing numerators.

1. $\frac{?}{8} = \frac{1}{2}$ $\frac{?}{12} = \frac{5}{6}$ $\frac{?}{12} = \frac{3}{4}$
2. $\frac{?}{10} = \frac{1}{5}$ $\frac{?}{24} = \frac{3}{8}$ $\frac{?}{24} = \frac{2}{3}$
3. $\frac{?}{16} = \frac{1}{4}$ $\frac{?}{16} = \frac{3}{4}$ $\frac{?}{12} = \frac{1}{4}$
4. $\frac{?}{12} = \frac{1}{6}$ $\frac{?}{10} = \frac{3}{5}$ $\frac{?}{16} = \frac{7}{8}$
5. $\frac{1}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12} = \frac{?}{15} = \frac{?}{24} = \frac{?}{30} = \frac{?}{42}$
6. $\frac{2}{3} = \frac{?}{6} = \frac{?}{9} = \frac{?}{12} = \frac{?}{18} = \frac{?}{21} = \frac{?}{27} = \frac{?}{45}$
7. $\frac{1}{4} = \frac{?}{8} = \frac{?}{12} = \frac{?}{16} = \frac{?}{20} = \frac{?}{24} = \frac{?}{40} = \frac{?}{60}$
8. $\frac{3}{4} = \frac{?}{8} = \frac{?}{12} = \frac{?}{16} = \frac{?}{28} = \frac{?}{32} = \frac{?}{36} = \frac{?}{48}$
9. $\frac{1}{6} = \frac{?}{12} = \frac{?}{18} = \frac{?}{24} = \frac{?}{30} = \frac{?}{36} = \frac{?}{48} = \frac{?}{72}$
10. $\frac{5}{6} = \frac{?}{12} = \frac{?}{18} = \frac{?}{24} = \frac{?}{30} = \frac{?}{36} = \frac{?}{48} = \frac{?}{72}$

Finding Least Common Denominators

1. Jerry spent $\frac{1}{2}$ his money for a sweater, $\frac{1}{3}$ of it for a shirt, and $\frac{1}{8}$ of it for a tie. What part of his money did he spend?

$$\frac{1}{2} = \frac{12}{24}$$

$$\frac{1}{3} = \frac{8}{24}$$

$$\frac{1}{8} = \frac{3}{24}$$

$$\frac{23}{24}$$

When adding unlike fractions, change them to like fractions, or fractions having the same denominator. The least common denominator of two or more fractions is the smallest number which can be divided evenly by the denominator of each of the fractions. The least common denominator (L. C. D.) of $\frac{1}{2}$, $\frac{1}{3}$, and $\frac{1}{8}$ is 24.

This is a good way to find the L. C. D. of two or more unlike fractions.

A. Test if the largest denominator contains each of the others evenly. If it does, this largest denominator is the L. C. D.

B. If the largest denominator is not the L. C. D., multiply it by 2, 3, 4, . . . in turn until you have a number that does contain each denominator evenly.

Find the L. C. D. of each group.

2. $\frac{1}{2}, \frac{1}{3}, \frac{1}{8}$
6. $\frac{1}{2}, \frac{2}{3}, \frac{1}{6}$
10. $\frac{1}{2}, \frac{1}{3}, \frac{1}{5}, \frac{1}{6}$
3. $\frac{1}{2}, \frac{1}{6}, \frac{1}{8}$
7. $\frac{2}{3}, \frac{3}{4}, \frac{5}{12}$
11. $\frac{3}{4}, \frac{1}{6}, \frac{3}{8}, \frac{5}{12}$
4. $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}$
8. $\frac{1}{3}, \frac{2}{5}, \frac{5}{6}$
12. $\frac{2}{3}, \frac{2}{5}, \frac{1}{6}, \frac{5}{8}$
5. $\frac{1}{3}, \frac{1}{6}, \frac{1}{9}$
9. $\frac{1}{6}, \frac{3}{8}, \frac{5}{16}$
13. $\frac{7}{12}, \frac{5}{16}, \frac{7}{24}, \frac{5}{32}$

Adding Unlike Fractions

1. Bob worked $\frac{2}{3}$ hr. one day and $\frac{3}{4}$ hr. the next day. How many hours did he work in all?

The L. C. D. for $\frac{2}{3}$ and $\frac{3}{4}$ is $\frac{8}{12}$ and $\frac{3}{4}$ as $\frac{9}{12}$.
The sum is $\frac{17}{12}$ or $1\frac{5}{12}$.

$$\frac{2}{3} = \frac{8}{12}$$

$$\frac{3}{4} = \frac{9}{12}$$

$$\frac{17}{12} = 1\frac{5}{12}$$

Add.

2. $\frac{5}{8}, \frac{2}{3}$

6. $\frac{5}{8}, \frac{1}{2}, \frac{3}{4}$

10. $\frac{5}{6}, \frac{3}{8}, \frac{1}{4}$

3. $\frac{5}{12}, \frac{7}{8}$

7. $\frac{1}{3}, \frac{2}{5}, \frac{1}{2}$

11. $\frac{4}{9}, \frac{2}{3}, \frac{5}{6}$

4. $\frac{7}{15}, \frac{1}{3}$

8. $\frac{1}{9}, \frac{2}{3}, \frac{5}{6}$

12. $\frac{3}{16}, \frac{3}{4}, \frac{3}{8}$

5. $\frac{5}{12}, \frac{2}{3}$

9. $\frac{3}{8}, \frac{1}{6}, \frac{2}{3}$

13. $\frac{1}{2}, \frac{1}{4}, \frac{7}{16}$

14.

$$\frac{1}{3}, \frac{3}{16}$$

$$\frac{7}{15}, \frac{1}{2}$$

$$\frac{7}{16}, \frac{5}{12}$$

$$\frac{7}{16}, \frac{7}{10}$$

$$\frac{1}{6}, \frac{7}{8}$$

$$\frac{2}{5}, \frac{2}{3}$$

$$\frac{2}{3}, \frac{3}{8}$$

$$\frac{3}{4}, \frac{5}{12}$$

$$\frac{1}{4}, \frac{5}{6}$$

$$\frac{1}{2}, \frac{3}{4}$$

$$\frac{1}{4}, \frac{5}{8}$$

$$\frac{7}{8}, \frac{3}{4}$$

$$\frac{2}{3}, \frac{2}{3}$$

$$\frac{3}{10}, \frac{1}{6}$$

$$\frac{1}{6}, \frac{1}{2}$$

$$\frac{1}{2}, \frac{2}{3}$$

Some pupils like to add fractions as shown at the right. The sum is $\frac{23}{24}$. Explain the use of each of the numbers in the example.

15. Find the sums in Examples 2 - 9 by this new method.

Add. Use either method.

16. $\frac{1}{2}, \frac{2}{3}, \frac{3}{5}, \frac{5}{6}$

17. $\frac{3}{4}, \frac{1}{6}, \frac{3}{8}, \frac{5}{12}$

L. C. D. = 24

$$\frac{1}{2} \quad 12$$

$$\frac{1}{3} \quad 8$$

$$\frac{1}{8} \quad 3$$

$$\frac{23}{24}$$

Adding Mixed Numbers

1. Robert worked $2\frac{1}{2}$ hr. in the afternoon and $3\frac{1}{4}$ hr. in the evening. The next day he worked $1\frac{3}{4}$ hr. in the afternoon and $3\frac{1}{2}$ hr. in the evening. How many hours did he work each day?

$$2\frac{1}{2} = 2\frac{2}{4}$$

$$1\frac{3}{4} = 1\frac{3}{4}$$

$$3\frac{1}{4} = 3\frac{1}{4}$$

$$3\frac{1}{2} = 3\frac{2}{4}$$

$$5\frac{3}{4}$$

$$4\frac{5}{4} = 5\frac{1}{4}$$

To find the sum of two or more mixed numbers, have the fractions of the mixed numbers as like fractions. Then add the fractions and add the whole numbers.

When the sum of the fractions is an improper fraction, change it to a mixed number and combine with the part of the sum that is a whole number.

Add. Leave each answer in simplest form.

2. $2\frac{1}{4}, 3\frac{1}{2}, 3\frac{1}{3}, 2\frac{3}{8}, 4\frac{1}{4}, 7\frac{1}{2}, 4\frac{1}{3}$

3. $1\frac{1}{6}, 2\frac{1}{8}, 3\frac{1}{6}, 4\frac{1}{8}, 5\frac{2}{5}, 8\frac{1}{3}, 3\frac{1}{4}$

4. $3\frac{7}{8}, 1\frac{5}{6}, 2\frac{7}{8}, 5\frac{1}{6}, 3\frac{1}{3}, 7\frac{1}{2}, 2\frac{1}{2}$

Subtracting Unlike Fractions and Mixed Numbers

1. Ann walks $\frac{5}{6}$ mi. and Al walks $\frac{3}{8}$ mi. How much farther does Ann go?
To subtract unlike fractions, change to like fractions and subtract.

$$\begin{array}{r} \frac{5}{6} = \frac{20}{24} \\ \frac{3}{8} = \frac{9}{24} \\ \hline \frac{11}{24} \end{array}$$

Subtract. Leave answers in simplest form.

2. $\frac{2}{3} - \frac{1}{5} = \frac{10}{15} - \frac{3}{15} = \frac{7}{15}$

In subtracting mixed numbers, you subtract the fractions and the whole numbers separately.

3. $3\frac{3}{4} - 1\frac{1}{4} = 2\frac{2}{4} = 2\frac{1}{2}$

When the fraction in the subtrahend of a mixed number is greater than the fraction in the minuend, change 1 whole in the minuend to a fraction with the right denominator.

$$6\frac{1}{4} - 3\frac{7}{8} = 5 + 1\frac{2}{8} - 3\frac{7}{8} = 2\frac{3}{8}$$

4. $3\frac{1}{4} - 1\frac{5}{8} = 2\frac{2}{8} - 1\frac{5}{8} = 1\frac{5}{8}$

5. $8\frac{1}{3} - 6 = 7\frac{2}{3} - 6 = 1\frac{2}{3}$

Multiplying Fractions and Mixed Numbers

1. Jimmy's father has a garden covering $\frac{4}{5}$ acre. Bill's garden is only $\frac{2}{3}$ as large. What part of an acre does Bill's garden cover?

$$\frac{2}{3} \times \frac{4}{5} = \frac{8}{15}$$

2. Mr. Brown owns $\frac{3}{4}$ acre, and has $\frac{8}{9}$ of it planted as a garden. What part of an acre is the garden?

$$\frac{8}{9} \times \frac{3}{4} = \frac{24}{36} = \frac{2}{3}$$

To multiply a fraction by a fraction, multiply the numerators together and write this as the numerator of the product. Multiply the denominators together and write this as the denominator of the product. If the product is not in simplest form, reduce it to lowest terms.

3. $\frac{2}{3} \times \frac{2}{5} = \frac{4}{15}$

You may shorten multiplication of fractions by cancelling before multiplying.

$$\frac{3}{4} \times \frac{8}{9} = \frac{2}{3}$$

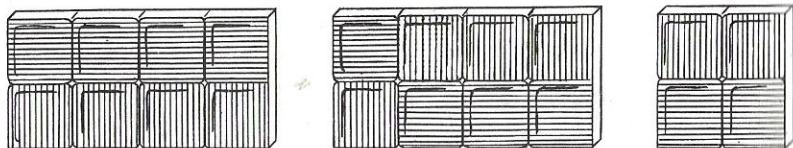
4. $\frac{3}{4} \times \frac{2}{3} = \frac{1}{2}$

5. $\frac{7}{8} \times \frac{4}{5} = \frac{7}{10}$

When mixed numbers are small, it is usually better to change them to improper fractions before multiplying.

$$\frac{7}{12} \times 1\frac{1}{5} = \frac{7}{12} \times \frac{6}{5} = \frac{7}{10}$$

6. $\frac{4}{5} \times 1\frac{1}{2} = \frac{4}{5} \times \frac{3}{2} = \frac{6}{5} = 1\frac{1}{5}$



Dividing Fractions and Mixed Numbers

1. There are $2\frac{1}{2}$ candy bars to be divided. Each child is to have $\frac{5}{8}$ of a bar. How many children will have candy? Point out the pieces each child gets.

$$2\frac{1}{2} \div \frac{5}{8} = \frac{5}{2} \times \frac{8}{5} = \frac{4}{1} = 4$$

A short way to divide by a fraction is to invert the divisor and multiply. To invert means to change the places of the numerator and the denominator.

There are $4\frac{1}{2}$ lb. of nuts in a jar. Draw a figure to show each of the following:

2. The number of $\frac{1}{2}$ -pound bags that can be filled from the jar.

3. The number of $\frac{3}{4}$ -pound bags that could be filled.

4. The number of $1\frac{1}{2}$ -pound bags that could be filled.

Use the short way to find the answers to 2, 3, and 4.

5. Six yards of ribbon are divided into pieces each $\frac{2}{3}$ yd. long. How many pieces are there? Draw a figure to prove your answer.

6. One candy bar weighs $\frac{5}{6}$ oz. How many candy bars will weigh $17\frac{1}{2}$ oz.?

Use the short way to divide each number in a row by the number at the end of the row.

7.	4	3	$2\frac{2}{3}$	$3\frac{1}{3}$	$\frac{5}{6}$	$\frac{3}{8}$	$\div \frac{2}{3}$
8.	9	3	$13\frac{1}{2}$	$2\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$	$\div 4\frac{1}{2}$
9.	10	2	$3\frac{1}{2}$	$3\frac{3}{4}$	$\frac{1}{2}$	$\frac{2}{3}$	$\div \frac{1}{2}$
10.	9	15	$7\frac{1}{2}$	$8\frac{1}{3}$	$\frac{3}{4}$	$\frac{3}{8}$	$\div \frac{3}{4}$
11.	14	10	$1\frac{3}{4}$	$10\frac{1}{2}$	$\frac{2}{3}$	$\frac{3}{4}$	$\div 1\frac{1}{6}$
12.	10	6	$7\frac{1}{2}$	$11\frac{1}{4}$	$\frac{3}{8}$	$\frac{5}{8}$	$\div 3\frac{3}{4}$

To invert a whole number, you write 1 over the number: $\frac{2}{1}$ when inverted becomes $\frac{1}{2}$.

13.	12	3	$7\frac{1}{2}$	$6\frac{2}{3}$	$\frac{6}{9}$	$\frac{5}{8}$	$\div 2$
14.	15	21	$10\frac{1}{2}$	$14\frac{5}{8}$	$\frac{3}{5}$	$\frac{5}{6}$	$\div 3$
15.	21	30	$10\frac{1}{2}$	$11\frac{3}{8}$	$\frac{7}{8}$	$\frac{4}{5}$	$\div 7$

16. The regular price of small cans of soup is 3 cans for 25 cents. At a special sale the price is 4 cans for 25 cents. How much can one save per can by purchasing at the sale?

17. Milk was 3 cans for 25 cents. At the sale it is 3 cans for 22 cents. How much can one save per can by purchasing at the sale?

18. Tomatoes were 2 cans for 25 cents. At the sale they are 3 cans for 35 cents. How much can one save by purchasing a dozen cans at the sale?

19. One can save $2\frac{2}{3}$ cents a bar by purchasing soap at the sale. How many bars does one need to purchase to save 80 cents?

There is extra practice in fractions on pages 334-337.



Can You Hit a Homer?

You add to get to First, subtract to get to Second, multiply to get to Third, and divide to get Home. Mark papers after each section.

Section I. Perfect Score = Safe on **First Base**

8	26	347	9807			
5	30	559	486			
9	45	950	74	$\frac{1}{2}$	$6\frac{1}{3}$	$7\frac{1}{2}$
6	37	774	893	$\frac{2}{7}$	$2\frac{1}{6}$	$6\frac{3}{8}$
4	79	886	9055	$\frac{8}{8}$	$1\frac{1}{8}$	$5\frac{2}{3}$
8	58	375	603	$\frac{3}{4}$	5	$8\frac{1}{3}$
2	73	197	2884	$\frac{1}{4}$		

Section II. Perfect Score = Safe on **Second**

816	4,892	58,613	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{2}{3}$
324	1,995	37,745	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{2}$
700	7,030	70,150	$9\frac{7}{8}$	$15\frac{1}{4}$	$8\frac{1}{3}$
203	831	46,420	$2\frac{1}{8}$	$8\frac{1}{3}$	$2\frac{3}{4}$

Section III. Perfect Score = Safe on **Third**

63	472	7,842	$\frac{1}{2} \times 6$	$\frac{5}{6} \times \frac{9}{10}$
28	49	73	$\frac{3}{8} \times 3\frac{1}{5}$	$2\frac{1}{2} \times 6$
94	603	9,084	$6\frac{1}{4} \times 8\frac{1}{3}$	$3\frac{1}{7} \times 14$
20	209	756	$9 \times 8\frac{1}{3}$	$1\frac{1}{2} \times 6\frac{2}{3}$

Section IV. Perfect Score = Safe at **Home**

28)764	46)8443	642)21,828	$\frac{7}{8} \div \frac{3}{4}$
93)3746	18)2651	774)37,152	$\frac{15}{16} \div 3$

Developing Power in Problem Solving

Problem solving may have been hard for you in the lower grades. It can be easy now.

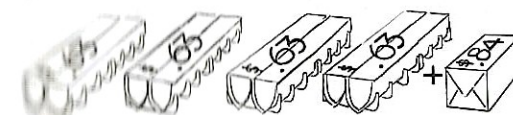
In solving a problem, you must read carefully and know—

- What the problem asks you to find.
- What facts the problem gives you.
- What you need to do to find the answer.

Before you work the problems, your teacher may have different pupils read the problems aloud and explain them, or you may work in pairs and explain to each other.

1. Mrs. Davis bought four dozen eggs at 63¢ a dozen and a pound of butter for 84¢. How much did she have to pay?

Sometimes a diagram will help you in solving a problem.



First Step → $\times 4$

Second Step → $+ .84$

$\$4 \times \$63 + \$84 = \$3.36$

2. Mr. Hall bought five shirts at \$3 each and gave the clerk a 20-dollar bill. How much change should he get back?

3. The Cates twins raised 36 chickens and sold them at 90¢ each. If the twins divided the money equally, how much did each receive?

4. Mr. Short had 342 hens and sold a third of them. If he received an average of \$1.10 apiece for the hens he sold, how much did he get?
5. Jack bought a quarter pound of cheese and gave the clerk \$1. If the cheese sold at 72¢ a pound, how much change did Jack get?
6. Helen is a salesgirl. She earns \$4 a day plus a tenth of the amount of her sales. What did she earn on a day when she sold \$43 worth of goods?
7. There were 225 oranges in a box. If 9 of them were spoiled and what remained were divided equally among the 36 children in a room, how many oranges did each child receive?
8. Find the cost of a pair of shoes at \$6.75 and 8 pairs of socks at \$.55 a pair.
9. Mr. Petrillo sold fancy fruit. He had a box containing 128 giant peaches. He found that 11 of them were too ripe to sell. How much did he get for the remainder of them at 15 cents each?
10. Mrs. Casey gathered 253 white eggs and 194 brown eggs in a week. She used 34 of the brown eggs in cooking, and sold all the eggs that remained. How many eggs did she sell?
11. Mrs. Green gathered 17 eggs on Monday, 18 on Tuesday, 19 on Wednesday, 23 on Thursday, 18 on Friday, 16 on Saturday, and 21 on Sunday. She sold all the eggs at 54 cents a dozen. How much did she get in all?

12. Tom weighs 103 lb., Dick weighs 107 lb., and Harry weighs 108 lb. How much do the three boys weigh? What is their average weight?
13. Mr. Dale paid 68¢ a pound for three hams. One of the hams weighed 22 lb., another weighed 26 lb., and the third weighed 29 lb. What was the total weight of the three hams? How much did Mr. Dale have to pay for the three hams?
14. Mr. Adams had \$325. He paid \$8 for shoes, \$56 for a suit, \$6 for a hat, and \$17 for shirts. How much did he spend? How much was left?
15. Janet addressed 63 pieces of mail in the morning. In the afternoon, she addressed 21 postcards, 18 letters, and 11 packages. How many pieces of mail did she address in the afternoon? How many did she address all day?
16. The red calf weighs 328 lb., the white calf weighs 406 lb., and the spotted calf weighs 394 lb. What is the average weight of the three calves?
17. At 72¢ a pound, what is the cost of three turkeys that weigh 18 lb., 21 lb., and 28 lb.?
18. The grocer had 144 cans of tomatoes. If he sold 28 cans on Monday, 31 on Tuesday, and 33 on Wednesday, how many are left?
19. Ted had \$5.60. If he earned 25¢, 40¢, 15¢, and 30¢ for running errands, how much money did he have then?

20. There are 320 pages in one book, 336 pages in another book, 352 pages in a third book, and 368 pages in a fourth book. What is the average number of pages in the four books?

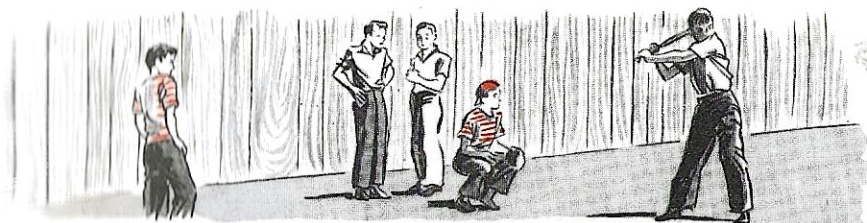
21. Sam gathered 19 eggs on Monday, 20 on Tuesday, 18 on Wednesday, 22 on Thursday, and 17 on Friday. How many dozen eggs did he gather in the five days?

22. While walking in the park, Ted counted 28 steps from the oak tree to the maple, 33 steps from the maple to the ash, and 41 steps from the ash back to the oak tree. If each step was $2\frac{1}{2}$ ft. long, how many feet did Ted walk in going from tree to tree?

23. Mrs. Lane has 7 packages of brown sugar, 5 packages of powdered sugar, and 12 packages of granulated sugar. If each package weighs two pounds, how many pounds of sugar does Mrs. Lane have?

24. A grocer bought 192 cans of soup. Of these, 48 cans were tomato soup, 16 cans were pea soup, 32 cans were asparagus soup, 24 cans were bean soup, and the rest of the cans were chicken soup. How many cans of chicken soup were there?

25. Mr. Harris earns \$225 a month. He uses \$60 of this for rent, \$75 for food, \$20 for clothing, and the remainder for other things. How much does he have for other things?



Your Turn at Bat

Add. Make 7 hits in **First Game**.

1.	7	35	485	790			
	4	63	829	7			
	9	78	147	86	$\frac{1}{8}$	$5\frac{1}{3}$	$7\frac{1}{6}$
	2	52	946	299	$\frac{1}{2}$	$4\frac{3}{8}$	$5\frac{1}{4}$
	4	96	809	84	$\frac{5}{6}$	8	$7\frac{1}{2}$
	3	58	390	85	$\frac{2}{3}$	$2\frac{7}{12}$	$9\frac{2}{3}$
	6	29	582	914			

Subtract. Make 12 hits in **Second Game**.

2.	728	5,238	58,005	$\frac{5}{6}$	$\frac{8}{9}$	$\frac{7}{8}$
	507	1,578	42,896	$\frac{1}{6}$	$\frac{2}{3}$	$\frac{1}{2}$
3.	900	5,090	40,810	$5\frac{7}{8}$	$14\frac{2}{3}$	$11\frac{1}{5}$
	507	389	34,009	$3\frac{3}{8}$	$7\frac{1}{6}$	$4\frac{7}{10}$

Multiply. Make 10 hits in **Third Game**.

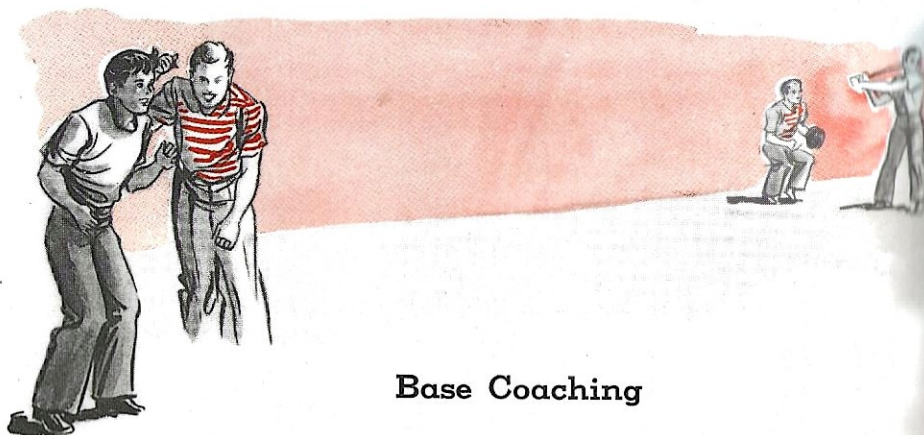
4.	87	852	8,209	56	305	4,076
	46	83	69	90	507	698

6. $\frac{3}{8} \times 4$ $\frac{4}{5} \times \frac{5}{8}$ $\frac{5}{6} \times 1\frac{1}{5}$ $4\frac{1}{2} \times \frac{4}{9}$

Divide. Make 8 hits in **Fourth Game**.

6.	34)2856	96)4068	69)5400	350)8097
7.	$4 \div \frac{1}{2}$	$\frac{3}{8} \div 9$	$\frac{7}{9} \div \frac{7}{8}$	$6\frac{2}{3} \div 12$

If you made 35 hits or more in the four games, you can practice stealing bases on page 33. Page 32 will give the rest of you base coaching.



Base Coaching

1. Practice on these pages if you missed in—

	Whole Numbers	Fractions
First Game	326	334
Second Game	328	335
Third Game	330	336
Fourth Game	332-3	337

2. Review page 19; then subtract.

$6\frac{2}{3}$	$7\frac{1}{2}$	$6\frac{1}{4}$	$8\frac{1}{3}$	$16\frac{2}{3}$	$12\frac{1}{2}$	$9\frac{3}{8}$
$3\frac{1}{3}$	$3\frac{3}{4}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$7\frac{1}{2}$	$6\frac{2}{3}$	$3\frac{3}{4}$

3. Rule: To divide by a fraction, invert the fraction and multiply. To check you may change the dividend and divisor to like denominators, and then divide the numerators.

Using the Rule

$$2\frac{1}{2} \div \frac{5}{8} =$$

$$\frac{5}{2} \div \frac{5}{8} =$$

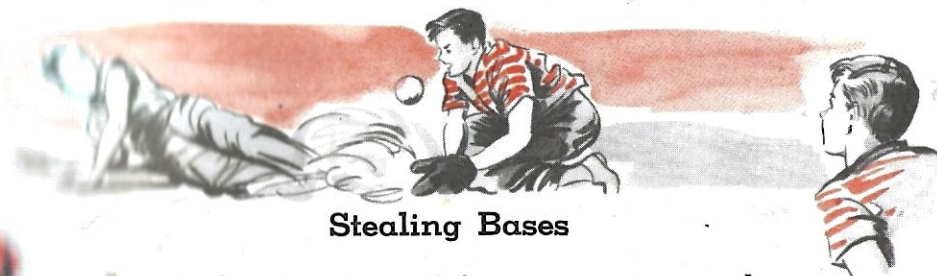
$$\frac{\cancel{5}}{2} \times \frac{8^4}{\cancel{5}} = 4$$

Check

$$2\frac{1}{2} \div \frac{5}{8} =$$

$$\frac{5}{2} \div \frac{5}{8} = \frac{20}{8} \div \frac{5}{8} \text{ or}$$

$$20 \text{ eighths} \div 5 \text{ eighths} = 4$$



Stealing Bases

A unit fraction has 1 for numerator, and may have any number for denominator.

A quick way to find the sum of two unit fractions is to write the sum of their denominators over the product of their denominators.

1. Find these sums the quick way.

$$\frac{1}{2} + \frac{1}{7} \quad \frac{1}{3} + \frac{1}{6} \quad \frac{1}{4} + \frac{1}{3} \quad \frac{1}{8} + \frac{1}{5} \quad \frac{1}{6} + \frac{1}{4}$$

To find the difference of two unit fractions write the difference of their denominators over the product of their denominators.

2. Find these differences the quick way.

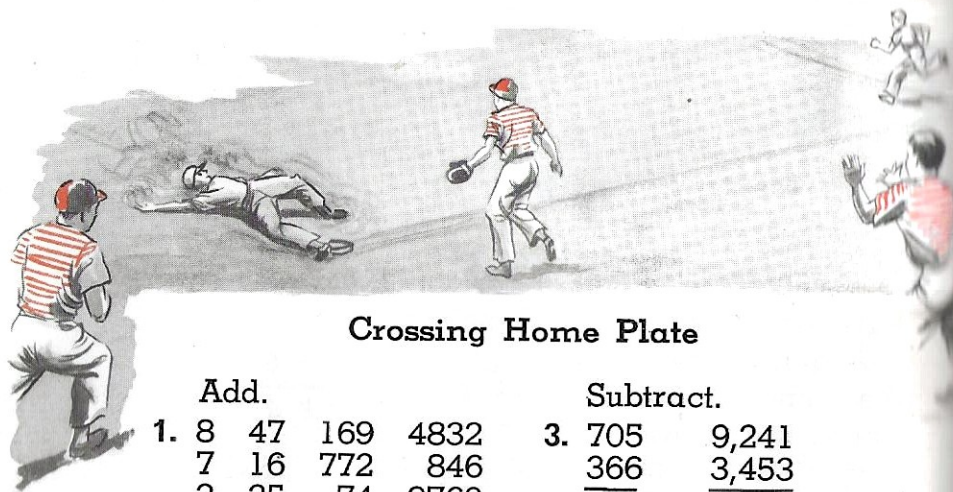
$$\frac{1}{2} - \frac{1}{7} \quad \frac{1}{3} - \frac{1}{6} \quad \frac{1}{2} - \frac{1}{6} \quad \frac{1}{4} - \frac{1}{8} \quad \frac{1}{3} - \frac{1}{8}$$

The example at the right shows you how to multiply mixed numbers without changing them to improper fractions.

$$\begin{array}{r} 9\frac{1}{2} \\ 4\frac{1}{3} \\ \hline 36 = 4 \times 9 \\ 3 = \frac{1}{3} \times 9 \\ 2 = 4 \times \frac{1}{2} \\ \frac{1}{6} = \frac{1}{3} \times \frac{1}{2} \\ \hline 41\frac{1}{6} \end{array}$$

3. Find these products the new way.

$$\begin{array}{ccccc} 12\frac{1}{2} & 6\frac{1}{4} & 8\frac{5}{6} & 15 & 8\frac{1}{3} & 8\frac{1}{3} \\ \hline 8\frac{1}{3} & 8\frac{2}{3} & 6\frac{1}{4} & 6\frac{2}{3} & 9\frac{3}{4} & 6\frac{3}{4} \end{array}$$

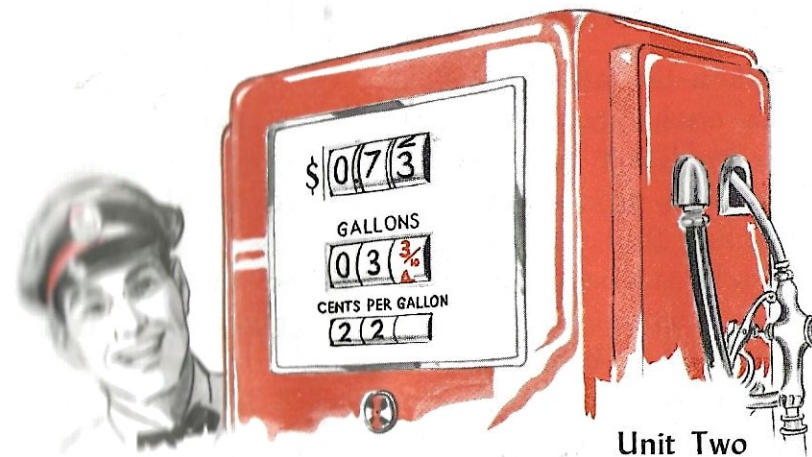


Crossing Home Plate

Add.				Subtract.	
1.	8	47	169	4832	3. 705 9,241
	7	16	772	846	<u>366</u> <u>3,453</u>
	2	25	74	9760	
	6	5	324	887	4. 843 18,406
	7	33	92	4433	<u>734</u> <u>12,307</u>
	9	18	9	2823	
	6	8	447	396	

2.	$\frac{1}{2}$	$\frac{2}{3}$	$3\frac{1}{3}$	$7\frac{1}{2}$	5. $\frac{7}{8}$ $6\frac{2}{3}$
	$\frac{2}{3}$	$\frac{1}{6}$	$5\frac{3}{8}$	$5\frac{3}{8}$	$\frac{3}{4}$ $2\frac{1}{2}$
	$\frac{4}{4}$	$\frac{2}{2}$	$2\frac{1}{4}$	$3\frac{3}{4}$	
	$\frac{2}{3}$	$\frac{5}{6}$	$1\frac{2}{3}$	$5\frac{1}{4}$	6. $\frac{3}{4}$ $9\frac{1}{8}$
					$\frac{2}{3}$ $3\frac{2}{3}$

Multiply.				Divide.	
7.	47	382	594	606	11. 53)97652 378)37459
	38	64	327	203	12. 78)37459 723)84698
8.	375	6709	4849	70	13. 61)54804 287)77508
	408	20	54	40	
9.	$\frac{3}{4} \times \frac{2}{5}$	$\frac{5}{6} \times \frac{5}{15}$	14.	$\frac{3}{4} \div \frac{2}{5}$	$\frac{4}{5} \div 2$
10.	$1\frac{2}{3} \times 2\frac{1}{2}$	$\frac{7}{8} \times 1\frac{3}{5}$	15.	$\frac{9}{16} \div 1\frac{1}{5}$	$7\frac{1}{2} \div 3$



Unit Two

Using Decimals

What is the purpose of each group of figures on the gasoline pump? Which figures change as the attendant fills the tank of an automobile? How do they change?

When the attendant begins to pump, there is a 0 in each small rectangle of the top group. If gasoline is 22 cents a gallon, what figure will be in each rectangle when the attendant has pumped 2 gallons? Six gallons? Amount of Sale

How many gallons have been pumped when the figures on the pump are as shown at the right?

\$1.54

Why is there a decimal point between the left and the middle rectangles?

Any number that has a decimal point may be called a **decimal number**.

Reading Other Numbers on the Gasoline Pump

When the attendant begins to pump, there is a 0 in each small rectangle of the middle group. The small 10 in a corner of the right rectangle will serve as denominator of a fractional part of a gallon that may be pumped.

Each number below is a mixed number, and each fraction has 10 as denominator: $4\frac{5}{10}$, $7\frac{2}{10}$, and $15\frac{8}{10}$. These numbers could also be written as 4.5, 7.2, and 15.8. You read 4.5 as **four and five tenths**.



The bottom group of figures tells the cost of one gallon of gasoline. This number changes only when the price of gasoline changes.

At 18 cents a gallon, the exact cost of 7.2 gallons of gasoline is \$0.18
7.2
36
126
cost is \$1.30.

When the exact answer contains a fractional part of a cent, it is often necessary to round it to the nearest cent. To do this, drop the fractional part of a cent if it is less than a half and make it a whole cent if it is equal to or greater than a half.

Find the cost of 15.8 gallons of gasoline at 23 cents a gallon, exactly and to the nearest cent.

Writing Decimal Numbers

On page 3 you learned how the same figure could be made to stand for many different whole numbers: 2 could stand for 2 ones, 2 tens, 2 hundreds, and so on. These same figures when written at the right of a decimal point stand for parts of wholes.

Whole Numbers

Parts of Wholes

One 1.

Ten 10 .1 Tenth

Hundred 100 .01 Hundredth

Thousand 1000 .001 Thousandth

Ten Thousand 10000 .0001 Ten thousandth

1. Read the numbers below.

A. .4	.26	.09	.475	.075	.009	.800
B. $\frac{4}{10}$	$\frac{26}{100}$	$\frac{9}{100}$	$\frac{475}{1000}$	$\frac{75}{1000}$	$\frac{9}{1000}$	$\frac{800}{1000}$
C. .080	.4372	.0875	.0093	.0006	.1250	.9800
D. $\frac{80}{1000}$	$\frac{4372}{10000}$	$\frac{875}{10000}$	$\frac{93}{10000}$	$\frac{6}{10000}$	$\frac{1250}{10000}$	$\frac{9800}{10000}$

2. How are Rows A and B alike? How are Rows C and D alike?

3. With Rows B and D covered, write common fractions that are equivalent to each decimal fraction in Rows A and C.

4. With Rows A and C covered, write decimal fractions that are equivalent to each common fraction in Rows B and D.

5. Read these decimals.

8.6 9.4 7.58 3.14 .125 .009 .0619



Writing Money Numbers as Decimals

The dollar, dime, and cent are used as money everywhere in our country. Some states have 1-mill and 5-mill tokens used for sales tax.

A dime is $\$ \frac{1}{10}$ and may be written \$.10.

A cent is $\$ \frac{1}{100}$ and may be written \$.01.

A mill is $\$ \frac{1}{1000}$ and may be written \$.001.

1. Write as decimals of \$1.

12¢ 35¢ 50¢ 99¢ 3 mills 10 mills

2. Which would you rather have?

\$10 or \$.10 \$10 or \$.99 \$10 or \$.085

Write as decimals of \$1.

3. One dollar and twenty cents

4. One dollar and nine cents

5. One dollar and one mill

6. Twelve cents; two cents; five mills

7. Read these numbers. How is a number in Row A like and how is it unlike the number directly under it in Row B?

A. \$90 \$8.75 \$875 \$.225 5280 1728

B. \$.90 \$.875 \$8.75 \$.2250 528 17.28

These are examples of **decimal fractions**: .28, .05, .116, .0739.

These are examples of **decimal mixed numbers**: 1.4, 3.76, 9.0457.

Both may be called **decimals** or **decimal numbers**.

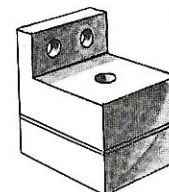
Adding Decimals

1. In making a machine three pieces of metal were fitted closely together. The thicknesses of the pieces were 1.142 in., .098 in., and .887 in. What is the thickness of the three pieces altogether?

In adding decimals, the decimal points of all the addends must be in a straight column.

The decimal point of the sum is placed directly under the column of decimal points of the addends.

$$\begin{array}{r} 1.142 \\ .098 \\ .887 \\ \hline 2.127 \end{array}$$



2. Add. Check by adding in opposite direction.

1.48	8.09	.76	3.124	.806	.97
3.26	.67	.81	1.008	1.832	.05
1.81	.08	.04	3.605	.472	.23
5.73	1.43	.90	9.762	.001	.30
<u>7.04</u>	<u>7.28</u>	<u>.63</u>	<u>1.050</u>	<u>6.823</u>	<u>.01</u>

Copy neatly in straight columns. Add.

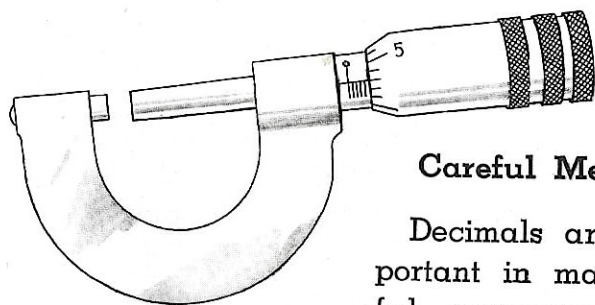
3. 1.37, 2.28, 1.73, 8.62, 5.03

4. .772, 6.146, .008, 9.329, 7.108

5. .0913, 1.8773, 6.0050, 14.5418, 8.5109

In most real problems, decimals used in the same problem will have the same number of decimal places. Where this is not true, extra care must be taken in writing the decimal points in a straight column and the addend figures of like name directly under each other.

$$\begin{array}{r} 81.6 \\ 4.05 \\ .384 \\ \hline 86.034 \end{array}$$



Careful Measuring

Decimals are very important in making careful measurements. A mechanic with a micrometer can measure to

.001 inch. With other measuring instruments he can measure even more accurately.

1. Four pieces of metal have the thicknesses: .003 in., .025 in., .008 in., and .017 in. If the four pieces are placed together, what will their combined thickness be?

2. Four pieces of iron weigh 12.4 lb., 6 lb., 8.3 lb., and 13.5 lb. What is their total weight?

3. The rainfall for each of three days was: 1.25 in., 3.50 in., and .87 in. What was the total rainfall for the three days?

4. Find the sum of 8.5 mi., 3.25 mi., 1.875 mi., and .375 mi.

Write these numbers in figures and add.

5. Sixty-nine and eight tenths, nine and seven tenths, thirty-six and nine tenths, fourteen and three tenths.

6. One and seven hundred thirty thousandths, three and forty-seven thousandths, seven and six hundred fifty thousandths.

Subtracting Decimals

1. It is 6.75 mi. from Alton to Hartford. How much farther must Roy ride his bicycle, if he has already ridden 2.50 mi.?

In subtracting decimals, the decimal point of the subtrahend is directly under the decimal point of the minuend. The decimal point of the remainder is directly under the decimal points of the minuend and the subtrahend.

Subtract.

$$\begin{array}{r} 2. \quad 165.3 \\ \quad 72.8 \\ \hline \end{array} \quad \begin{array}{r} 4.07 \\ \quad 1.34 \\ \hline \end{array} \quad \begin{array}{r} .967 \\ \quad .068 \\ \hline \end{array} \quad \begin{array}{r} 10.349 \\ \quad 8.196 \\ \hline \end{array} \quad \begin{array}{r} 19.8710 \\ \quad 10.3909 \\ \hline \end{array}$$

$$\begin{array}{r} 3. \quad 86.54 \\ \quad 24.80 \\ \hline \end{array} \quad \begin{array}{r} 7.65 \\ \quad 2.66 \\ \hline \end{array} \quad \begin{array}{r} 8.00 \\ \quad 7.13 \\ \hline \end{array} \quad \begin{array}{r} 78.584 \\ \quad 15.522 \\ \hline \end{array} \quad \begin{array}{r} 27.9301 \\ \quad 15.9471 \\ \hline \end{array}$$

$$\begin{array}{r} 4. \quad 587.5 \\ \quad 87.6 \\ \hline \end{array} \quad \begin{array}{r} 77.1 \\ \quad 37.5 \\ \hline \end{array} \quad \begin{array}{r} 9.30 \\ \quad 5.58 \\ \hline \end{array} \quad \begin{array}{r} 704.37 \\ \quad 237.94 \\ \hline \end{array} \quad \begin{array}{r} 86.3034 \\ \quad 79.4850 \\ \hline \end{array}$$

$$5. \quad .89 - .17 \quad 7.34 - 5.76 \quad 10.27 - 8.68$$

$$6. \quad .73 - .28 \quad 16.3 - 9.5 \quad 79.13 - 50.25$$

7. Two and nine tenths from four and six tenths.

8. Sixteen hundredths from forty-two hundredths.

When either the minuend or the subtrahend has fewer decimal places than the other, annex enough zeros so that each has the same number of decimal places.

$$9. \quad 6.4 - 3.18 \quad 7.5 - 2.25 \quad 8.3 - 1.66$$

$$10. \quad 8.75 - 4.2 \quad 3.47 - 1.6 \quad 7.96 - 5.4$$

Multiplying Decimals

1. What is the area of a rectangle 3.2 in. long and 2.8 in. wide?

Using Common Fractions

$$3.2 = \frac{32}{10}$$

$$2.8 = \frac{28}{10}$$

$$\frac{32}{10} \times \frac{28}{10} = \frac{896}{100} = 8.96$$

Using Decimals

$$\begin{array}{r} 3.2 \\ \times 2.8 \\ \hline \end{array}$$

$$\begin{array}{r} 256 \\ 64 \\ \hline \end{array}$$

$$8.96$$

When you multiply tenths by tenths (common fractions) the product is hundredths. Explain.

If you multiply hundredths by tenths (common fractions) the product is thousandths. Explain.

In multiplying decimals, point off as many decimal places in the product as there are decimal places in the multiplicand and multiplier together.

Multiply.

2. 27.4	39.8	42.3	12.52	2.98
<u>.6</u>	<u>.9</u>	<u>3.5</u>	<u>.44</u>	<u>1.05</u>

3. .97	10.3	7.68	38.32	50.832
<u>.53</u>	<u>2.25</u>	<u>.5</u>	<u>20</u>	<u>6</u>

To multiply by 10, 100, or 1000 move the decimal point as many places to the right as there are zeros in the multiplier.

4. Multiply each number below by 10; by 100; by 1000.

.001	2.355	.75	8.36	.4	9.5
------	-------	-----	------	----	-----

Dividing Decimals

1. A dealer paid \$595.32 for 82 tons of coal. What was the price per ton?

$$\begin{array}{r} \$7.26 \\ 82 \overline{) \$595.32} \\ \underline{574} \end{array}$$

When you divide a decimal by a whole number, place the decimal point of the quotient directly above the decimal point of the dividend.

Divide. Check by multiplying.

- | | | |
|-----------------|-------------|-------------|
| 2. 14.4 by 12 | 1.21 by 11 | 1.728 by 12 |
| 3. 138.24 by 24 | 1.024 by 32 | .512 by 8 |

When the divisor is a decimal, move its decimal point enough places to the right to make it a whole number. Move the decimal point of the dividend the same number of places to the right. You are really multiplying divisor and dividend by 10, 100, or 1000. Point off the quotient.

$$\begin{array}{r} 1.6 \\ 1.2 \overline{) 1.92} \\ \underline{12} \\ 72 \\ \underline{72} \end{array}$$

4. 7.5)22.5	.02)8.78	.8)3.44	.25)3.75
5. .002)584	4.2)67.2	.16)347.2	.026)88.4
6. .48)249.6	6.3)3591	.79)6399	.24)17.28

To divide by 10, 100, or 1000, move the decimal point as many places to the left as there are zeros in the divisor.

Divide by the number at the end of the row.

7. 640	64	6.4	.64	12.43	.03	÷ 10
8. 300	30	3.5	.35	563.4	.25	÷ 100
9. 500	80	750	4.8	150.9	250	÷ 1000

Appliance	Week	Month
Refrigerator	\$.25	\$1.07
Percolator	.06	.27
Toaster	.02	.09
Washer	.02	.09
Cleaner	.01	.05
Ironer	.07	.31
Iron	.05	.22

Problems with Decimals

The table at the left gives the approximate cost of electricity in using certain household appliances.

1. How much does it cost to run a refrigerator for 12 months?
2. How much does it cost to use an ironer for 12 months?
3. How much more does it cost to use an ironer for 12 months than to use an iron for 12 months?
4. How much does it cost to use a washer for 36 weeks?
5. Mrs. Smith has a refrigerator, a toaster, an ironer, and a washer. How much does it cost to use these for a week? For a month? For 24 weeks? For 6 months?
6. How many times as much does it cost to use a percolator for a week as to use a washer for a week?
7. About how many times as much does it cost to use an ironer for a month as to use a cleaner for a month?
8. A salesman told Mrs. Brown that it cost only 75¢ a year to use the washer he sold. How much was this a month?

Changing Common Fractions to Decimals

To change a common fraction to a decimal, divide the numerator of the fraction by its denominator.

To change a mixed number to a decimal, change the fraction part of the mixed number to a decimal fraction.

$$\frac{1}{4} = \frac{.25}{4 \overline{)1.00}}$$

$$6\frac{1}{4} = 6.25$$

Change to decimals.

1. $\frac{1}{2}$	$\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{5}$	$\frac{2}{5}$	$\frac{3}{5}$	$\frac{4}{5}$
2. $\frac{3}{8}$	$\frac{5}{8}$	$\frac{7}{8}$	$\frac{1}{10}$	$\frac{3}{10}$	$\frac{7}{10}$	$\frac{9}{10}$
3. $4\frac{1}{2}$	$6\frac{1}{4}$	$3\frac{3}{4}$	$3\frac{1}{5}$	$5\frac{2}{5}$	$7\frac{3}{5}$	$1\frac{4}{5}$
4. $1\frac{3}{8}$	$4\frac{5}{8}$	$7\frac{7}{8}$	$1\frac{1}{10}$	$2\frac{3}{10}$	$4\frac{7}{10}$	$6\frac{9}{10}$

Many useful common fractions do not come out evenly as decimals. Sometimes it is best to leave them as: $\frac{1}{3} = 33\frac{1}{3}\%$. Sometimes it is best to round off the decimal to the desired number of places, as $\frac{1}{4} = .33\frac{1}{3}$ or .33, or $\frac{2}{3} = .66\frac{2}{3}$ or .67. The same principle is used in rounding decimals as is used in rounding whole numbers.

Change to decimals. Round each off correct to two decimal places.

5. $\frac{2}{3}$	$\frac{1}{6}$	$\frac{5}{6}$	$\frac{5}{12}$	$\frac{11}{12}$	$\frac{2}{15}$	$\frac{13}{15}$	$\frac{9}{16}$
------------------	---------------	---------------	----------------	-----------------	----------------	-----------------	----------------

Change each fraction in 5 above to a decimal correct to three decimal places.

6. Write as a decimal correct to three decimal places: $\frac{3}{8}$ in.; $\frac{7}{16}$ in.; $\frac{15}{32}$ in.

Changing Decimals to Fractions or Mixed Numbers

To change a decimal to a common fraction, write the decimal with its denominator instead of the decimal point. The denominator will be 1 followed by as many zeros as the number has decimal places. Reduce to lowest terms.

$$.5 = \frac{5}{10} = \frac{1}{2}; \quad .75 = \frac{75}{100} = \frac{3}{4}; \quad .625 = \frac{625}{1000} = \frac{5}{8}$$

Change to common fractions or mixed numbers.

1. .35 .24 .16 .375 .750 .275 .900
2. 6.4 8.6 3.75 4.50 1.8 2.80 5.375

Read these decimals and give their equivalent common fractions quickly.

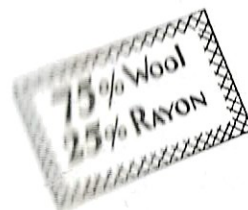
3. .50 .25 .75 .10 .30 .20 .60
4. .02 .90 .05 .15 .40 .06 .70
5. $.33\frac{1}{3}$ $.12\frac{1}{2}$ $.62\frac{1}{2}$ $.66\frac{2}{3}$ $.37\frac{1}{2}$ $.16\frac{2}{3}$ $.87\frac{1}{2}$

Read these common fractions and give their equivalent decimals quickly.

6. $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{5}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{8}$ $\frac{1}{20}$ $\frac{3}{20}$
7. $\frac{3}{4}$ $\frac{2}{3}$ $\frac{3}{8}$ $\frac{5}{8}$ $\frac{7}{8}$ $\frac{3}{10}$ $\frac{7}{10}$ $\frac{2}{5}$
8. $\frac{4}{5}$ $\frac{9}{10}$ $\frac{1}{50}$ $\frac{3}{50}$ $\frac{3}{5}$ $\frac{5}{6}$ $\frac{6}{25}$ $\frac{9}{20}$

Use common fraction equivalents and find these answers quickly. No pencils, please.

9. $.12\frac{1}{2} \times 64$ $.16\frac{2}{3} \times 36$ $.37\frac{1}{2} \times 32$
10. $.20 \times \$350$ $.40 \times \$750$ $.75 \times \$240$
11. $.33\frac{1}{3} \times 60$ $.66\frac{2}{3} \times 48$ $.87\frac{1}{2} \times 24$
12. $.62\frac{1}{2} \times 56$ $.25 \times 800$ $.50 \times \$9.60$



The Meaning of Percentage

It is a short and easy step from the use of decimals to the use of per cents. *Per cent means hundredths.* A whole may be written as $\frac{100}{100}$, or 1.00, or it may be written as 100%.

The whole of anything equals 100% of it.

1. Tom got all his spelling words right. His grade was 100%. Ruth got only $\frac{1}{2}$ her spelling words right. What was her grade?

2. A tie made entirely of silk is labeled "100% Pure Silk." If only $\frac{1}{4}$ of the material in the tie were silk, what per cent would the label have to read?

3. Explain each of the labels at the top of the page.

4. If 15% of the pupils are absent today, what per cent are present?

5. If 56% of the pupils in Tom's room are girls, what per cent are boys?

6. If 25% of the peach crop is destroyed by a late frost, what per cent is not destroyed?

7. If Tom's team won 85% of the games played, what per cent did they fail to win?

8. If a blanket is 85% wool, what per cent is not wool?

Decimals and Percentages

In writing hundredths, the per cent sign, %, may be used instead of the decimal point.

$$.25 = 25\% \quad .04 = 4\% \quad .33\frac{1}{3} = 33\frac{1}{3}\%$$

1. Write as percentages.

$$.06 \quad .12\frac{1}{2} \quad .08\frac{1}{3} \quad .05 \quad .40 \quad .62\frac{1}{2} \quad .06\frac{1}{4} \quad .16\frac{2}{3}$$

Any decimal may be changed to a percentage by moving the decimal point two places to the right and writing the per cent sign.

$$.125 = 12.5\% \quad .0625 = 6.25\% \quad 1.25 = 125\%$$

2. Write as percentages.

$$.375 \quad 1.33\frac{1}{3} \quad .875 \quad .132 \quad .005 \quad 8.75 \quad 2.125$$

To change a percentage to a decimal, move the decimal point two places to the left and omit the per cent sign.

$$6\% = .06 \quad 12\% = .12 \quad 125\% = 1.25$$

Write as decimals.

$$3. \quad 110\% \quad 135\% \quad 1\% \quad 200\% \quad 3\% \quad 150\%$$

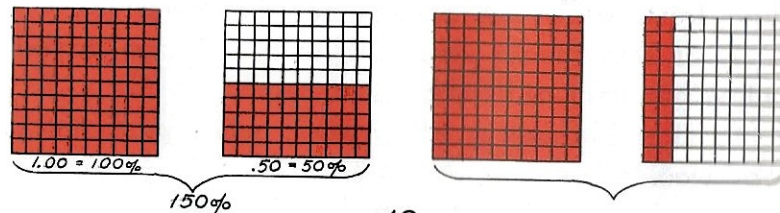
4. Figure A below shows 150%. What percentage does Figure B show?

Draw squares and color them to show

$$5. \quad 50\% \quad 100\% \quad 125\% \quad 1.75 \quad .10 \quad .75 \quad .24$$

Figure A

Figure B



Common Fractions and Percentages

Any common fraction or mixed number may be written as a percentage.

$$\frac{1}{4} = .25 = 25\% \quad 1\frac{4}{5} = 1.8 = 180\%$$

1. Write as percentages.

$$\frac{3}{4} \quad \frac{1}{2} \quad \frac{3}{8} \quad \frac{1}{16} \quad \frac{2}{3} \quad \frac{3}{5} \quad \frac{5}{6} \quad \frac{1}{6}$$

Any percentage can be written as a decimal and can then be changed to a fraction or a mixed number.

$$75\% = .75 = \frac{75}{100} = \frac{3}{4}$$

$$125\% = 1.25 = \frac{125}{100} = \frac{5}{4} = 1\frac{1}{4}$$

Certain percentages can be changed to simple common fractions, as $75\% = \frac{3}{4}$, and are used so often you should remember them. Some of them are in the table below. Copy this table, filling in each blank space.

	Fraction	Decimal	Percentage	Fraction	Decimal	Percentage
2.	$\frac{1}{50}$		2%	$\frac{1}{2}$		
3.	$\frac{1}{40}$	$.02\frac{1}{2}$			.75	
4.	$\frac{1}{20}$		5%	$\frac{2}{3}$		$66\frac{2}{3}\%$
5.	$\frac{1}{16}$	$.06\frac{1}{4}$		$\frac{5}{6}$	$.83\frac{1}{3}$	
6.	$\frac{1}{15}$	$.06\frac{2}{3}$		$\frac{3}{8}$	$.37\frac{1}{2}$	
7.	$\frac{1}{12}$		$8\frac{1}{3}\%$	$\frac{5}{8}$		$62\frac{1}{2}\%$
8.		.10	10%	$\frac{7}{8}$	$.87\frac{1}{2}$	
9.	$\frac{1}{8}$	$.12\frac{1}{2}$			.30	30%
10.	$\frac{1}{6}$		$16\frac{2}{3}\%$	$\frac{1}{3}$		$33\frac{1}{3}\%$

Finding Percentages of Numbers

1. Mr. Hill stored 480 bu. of apples. If $12\frac{1}{2}\%$ of them spoiled, how many bushels spoiled?

Since $12\frac{1}{2}\%$ can be changed to a simple fraction, this is the best way to find the answer.

$$12\frac{1}{2}\% = .12\frac{1}{2} = \frac{1}{8}$$

$$\frac{1}{8} \times 480 \text{ bu.} = 60 \text{ bu.}$$

2. Last year Mr. Hill stored 540 bu. of apples and $16\frac{2}{3}\%$ of them spoiled. How many bushels spoiled last year?

500 bu.

3. Mr. Hill stored 500 bu. of potatoes and 11% of them spoiled. How many bushels spoiled?

.11

500

500

55.00 bu.

Since 11% cannot be changed to a simple common fraction, it is best to multiply 500 bu. by .11. The answer is 55 bu.

4. Last year Mr. Hill stored 325 bu. of potatoes and 16% of them spoiled. How many bushels of potatoes spoiled last year?

To find a percentage of a number, write the per cent as a common fraction or decimal and multiply.

Find the answers. Use a common fraction when that makes the work easier.

- | | | |
|----------------------------|-------------------------|-------------------------|
| 5. 20% of 155 | 75% of 160 | 14% of 300 |
| 6. $66\frac{2}{3}\%$ of 60 | 90% of 60 | 25% of 324 |
| 7. $8\frac{1}{3}\%$ of 120 | 13% of 200 | $37\frac{1}{2}\%$ of 16 |
| 8. 1% of 1200 | $\frac{1}{2}\%$ of 1200 | $\frac{3}{4}\%$ of 1200 |
| 9. 50% of 156 | $2\frac{1}{2}\%$ of 160 | $7\frac{1}{2}\%$ of 160 |

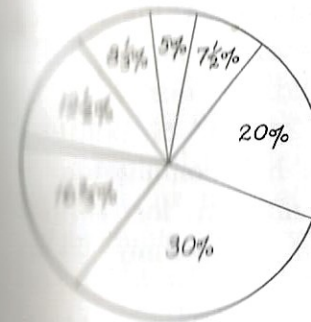
Jack Plants a Garden

Jack decided to earn money during the summer by raising a large garden. He had \$120 to pay the expenses. He made a circle graph to show how he would use the \$120.



Garden Expenses

- $12\frac{1}{2}\%$ Rent of garden
- $8\frac{1}{3}\%$ Rent of roadside stand
- $7\frac{1}{2}\%$ Plowing
- 5% Tools
- $16\frac{2}{3}\%$ Seeds
- 20% Young plants
- 30% Fertilizer



1. Counting the total expenses as \$120, what was the expense of each item listed?

2. Jack bought 480 cabbage plants and $33\frac{1}{3}\%$ of them died. How many plants died? How many plants were left?

3. Jack bought 450 tomato plants. A late frost killed 12% of them. How many tomato plants were killed by the frost?

4. He raised 150 melons, but 28% of them were unfit for use. How many melons were unfit for use? How many were good?



Mary Helps Jack Sell Fruits and Vegetables

Mary helped Jack at the roadside stand. Jack paid her a certain per cent of the money she got when she sold something. The money that Jack would pay to Mary is called **commission**.

1. Jack paid Mary 6% commission for selling potatoes. If Mary sold a bushel of potatoes for \$4.50, how much commission did she earn?

2. In one day, Mary sold 24 bu. of potatoes at \$4.50 a bushel. What was her commission?

3. Jack paid her 8% commission for selling tomatoes. What did she earn for selling \$5.50 worth of tomatoes?

4. Corn was easy to sell, so Jack paid Mary only 1% for selling corn. How much was Mary's commission on 14 doz. ears of corn at 50¢ a dozen?

5. Watermelons were hard to sell. Jack paid Mary $12\frac{1}{2}\%$ for selling watermelons. How much was her commission for selling a large one for \$.60 and two smaller ones at \$.50 each?

Find the commission on each of these.

6. 40 bunches of carrots at 2 bunches for 15¢. The per cent of commission was 2%.

7. 12 boxes of berries at 3 boxes for 85¢. The rate of commission was 4%.

Selling at a Discount

Some vegetables do not keep until the next day. Rather than have them spoil, Jack and Mary sold them at less than the regular price.

Articles sold at a reduced price are sold at a discount. The amount by which the regular price is reduced is called the discount.

1. Shelled peas dry quickly. Jack and Mary sold \$2 worth of them at a discount of 15%. How much was the discount? How much did they get for the peas?

2. Mary sold lettuce at a discount of 20%. If the regular price was 10¢ a head, how much was the discount on a head of lettuce? What was the reduced, or marked down, price?

Discounts are very common in business. A merchant will reduce prices at the end of the season to make room for new goods. Explain the advertisement at the bottom of the page.

3. If each of the following is reduced 25%, how much is the discount? How much is the reduced price?

A 69-dollar overcoat

A hat worth \$7

Shoes priced at \$8.20

Gloves worth \$2.80

WINTER WEAR REDUCED 25%

45 Suits, NOW \$33.75

\$59 Suits, NOW \$44.25

10 Hats, NOW \$7.50

\$4.75 Gloves, NOW \$3.57



Developing Power in Problem Solving

Tell what needed fact is missing in each problem below. Supply the correct number for this fact and solve the problem.

1. How many hours are in seven days?
2. How many times does an hour hand go around a clock face in five days?
3. How many times does a minute hand go around a clock face in 24 hours?
4. Jack pays \$15 a month for his room. How much is this for a year?
5. Jenny pays \$3 a week for her room. How much is this for a year?
6. What is the cost of 3 doz. balls at 5¢ each?

Tell what needed fact is missing in each problem below. Supply a reasonable number for this fact and solve the problem.

7. Betty and her friends got weighed. Their average weight was 96 lb. What was the total weight of all the girls?
8. Mr. Hughes walks at the rate of 3 mi. an hour. How many miles did he walk last Saturday?
9. How far can Albert ride his bicycle in $2\frac{1}{2}$ hr.?
10. Find the cost of a 22-pound turkey.
11. Mr. Allen rode 87 mi. on a train, drove

18 mi. in an automobile, and rode a horse the rest of the way. How far did he go in all?

12. Mrs. Gray bought a pair of shoes and gave the clerk a 20-dollar bill. How much change should she get back?

A fact is stated in each problem below that is not needed in solving the problem. Tell what this fact is. Solve the problem.

13. Agnes bought four pieces of ribbon, each three yards long, at 12¢ a yard. What was the total length of the ribbon she bought?

14. Tom bought four 13-inch balls at 69 cents each. How much did he have to pay?

15. Charles can drive 16 miles on a gallon of gasoline. If gasoline costs $20\frac{1}{2}$ ¢ a gallon, how far can he drive on five gallons of gasoline?

16. A large ham weighed 35 lb. Mrs. Jones bought a 12-pound piece at 43 cents a pound. How much did Mrs. Jones have to pay?

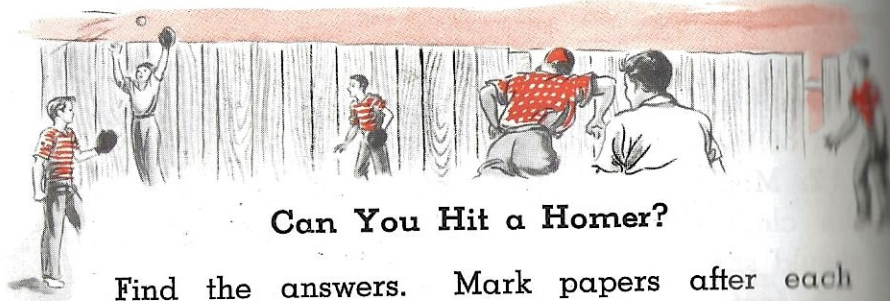
17. George left at 8:30 a.m. and drove 96 miles. If he arrived at 11:30 a.m. the same day, how many hours did it take to make the trip?

Watch these. You are on your own.

18. Bobby bought six pencils at 5¢ each. Each pencil was 7 in. long. What did they cost?

19. Mother bought three 39-cent cakes that were a day old for 27¢ each. What did they cost?

20. How many yards around a rug that is 9 ft. wide and 12 ft. long?



Can You Hit a Homer?

Find the answers. Mark papers after each section. Four perfect scores make a homer.

Section I. Perfect Score = Safe on **First Base**

1. $15.45 + .23 + .58 + 1.87 + .01 + 389.60$
2. $7.897 + .089 + .892 + 57.316 + 1.545 + 17.408$
3. $7.3 + .9 + 1.0 + 409.6 + 27.5 + 64.8 + 21.0$
4. $1.46 + 7.798 + 6.0742 + 250.11 + 630 + .5$
5. $.005 + .14 + 31.089 + 224.67 + .006 + 4.7$

Section II. Perfect Score = Safe on **Second**

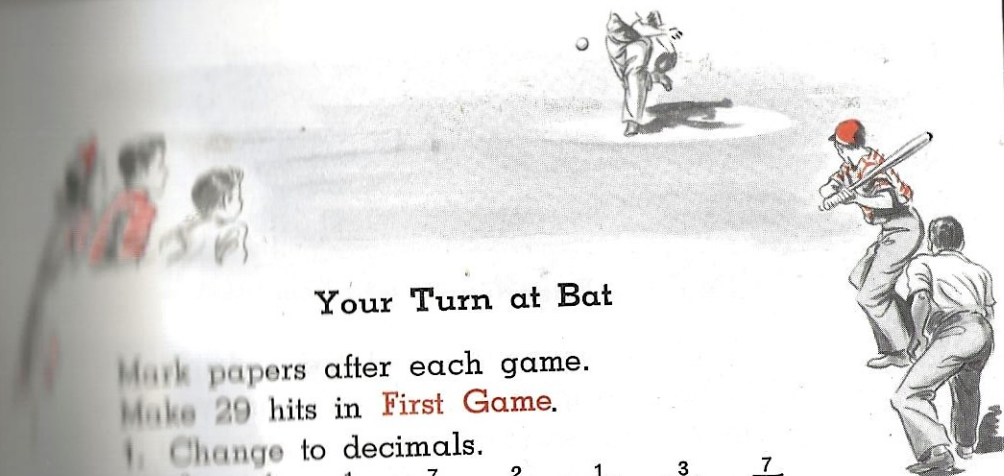
6. $\begin{array}{r} 7.02 \\ -3.59 \\ \hline \end{array}$ $\begin{array}{r} 5.04 \\ -2.57 \\ \hline \end{array}$ $\begin{array}{r} 56.9 \\ -15.2 \\ \hline \end{array}$ $\begin{array}{r} 345.68 \\ -241.98 \\ \hline \end{array}$ $\begin{array}{r} 100.015 \\ -64.703 \\ \hline \end{array}$
7. $\begin{array}{r} 34.5 \\ -33.8 \\ \hline \end{array}$ $\begin{array}{r} 73.0 \\ -72.4 \\ \hline \end{array}$ $\begin{array}{r} 7.23 \\ -.09 \\ \hline \end{array}$ $\begin{array}{r} 75.300 \\ -75.001 \\ \hline \end{array}$ $\begin{array}{r} 124.900 \\ -6.989 \\ \hline \end{array}$

Section III. Perfect Score = Safe on **Third**

8. 342.45×58 $458 \times .67$ $365.1 \times .7$
9. $500.001 \times .5$ $35.89 \times .75$ 3.425×5.7
10. $67.92 \times .06$ $748.3 \times .007$ $45.79 \times .53$

Section IV. Perfect Score = Safe at **Home**

11. $\begin{array}{r} .3 \overline{)72} \end{array}$ $\begin{array}{r} 7 \overline{)32.9} \end{array}$ $\begin{array}{r} .08 \overline{)288} \end{array}$
12. $\begin{array}{r} .006 \overline{)390} \end{array}$ $\begin{array}{r} .04 \overline{)14.92} \end{array}$ $\begin{array}{r} 8 \overline{)685.6} \end{array}$
13. $\begin{array}{r} .24 \overline{)5.76} \end{array}$ $\begin{array}{r} 3.4 \overline{)16.32} \end{array}$ $\begin{array}{r} 26 \overline{)1.82} \end{array}$
14. $\begin{array}{r} 780 \overline{)319.8} \end{array}$ $\begin{array}{r} 36.5 \overline{)8.395} \end{array}$ $\begin{array}{r} .454 \overline{)11.35} \end{array}$
15. $\begin{array}{r} 51.3 \overline{)3.078} \end{array}$ $\begin{array}{r} .413 \overline{)17.759} \end{array}$ $\begin{array}{r} 9.02 \overline{)632.302} \end{array}$



Your Turn at Bat

Mark papers after each game.

Make 29 hits in **First Game**.

1. Change to decimals.

$$\frac{1}{4} \quad \frac{4}{6} \quad \frac{1}{8} \quad \frac{7}{20} \quad \frac{2}{5} \quad \frac{1}{2} \quad \frac{3}{8} \quad \frac{7}{8}$$

2. Write as mixed numbers.

$$1.25 \quad 5.6 \quad 7.15 \quad 3.66\frac{2}{3} \quad 9.75 \quad 1.90 \quad 2.05 \quad 8.8$$

3. Write as common fractions.

$$30\% \quad 50\% \quad 83\frac{1}{3}\% \quad 12\frac{1}{2}\% \quad 75\% \quad 60\%$$

4. Write as decimals.

$$60\% \quad 5\% \quad 35\% \quad 100\% \quad 125\% \quad 200\% \quad 235\%$$

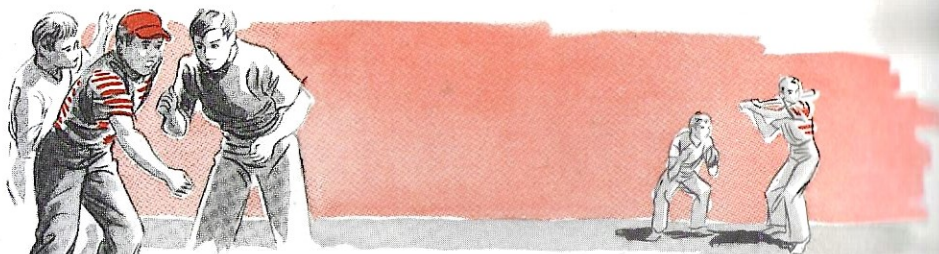
Copy the table. Fill in each blank. Make 8 hits in the **Second Game**.

	Fraction	Decimal	Percentage
6.	$\frac{1}{12}$	<u> </u>	<u> </u>
6.	<u> </u>	.45	<u> </u>
7.	<u> </u>	<u> </u>	110%
8.	$\frac{7}{50}$	<u> </u>	<u> </u>

Find the answers. Make 12 hits the **Third Game**.

9. $62\frac{1}{4}\%$ of 72 24% of 935 14% of 54.5
10. $8\frac{1}{4}\%$ of 84 7% of 539 2% of 2,408
11. 103% of 683 93% of 5 $\frac{1}{2}\%$ of 160
12. $\frac{1}{4}\%$ of 56.4 18% of \$150 40% of \$35

If you made 47 hits or more practice on page 59.
Others may work out on page 58.



Base Coaching

Row A gives the numbers of the examples on page 57. Row B gives you pages where you can find help on the examples you missed. Do the work you need from Row B.

A	1	2	3	4	5-8	9-12
B	45	46	49	48	49	50

1. What is the rule for changing a fraction to a decimal? On what page do you find the rule?

2. Change to decimals.

$$\frac{1}{5} \quad \frac{3}{5} \quad \frac{7}{10} \quad \frac{1}{4} \quad \frac{5}{8} \quad \frac{9}{16} \quad \frac{5}{12} \quad \frac{5}{6}$$

3. What is the rule for changing a decimal to a common fraction? On what page is it?

4. Change to common fractions.

$$.4 \quad .25 \quad .62\frac{1}{2} \quad .16\frac{2}{3} \quad .55 \quad .80 \quad .33\frac{1}{3} \quad .15$$

5. What is the rule for finding a percentage of a number? On what page is this rule?

6. Write as a decimal $\frac{1}{2}$; $\frac{1}{2}\%$; $\frac{4}{5}$; $\frac{4}{5}\%$.

Find the answers.

7. 50% of \$60 5% of \$60 .5% of \$60

8. 25% of 180 $2\frac{1}{2}\%$ of 180 $\frac{1}{4}\%$ of 180

9. 4% of 300 40% of 300 400% of 300

10. Practice on pages 338 and 339.



Stealing Bases

These short cuts will help you in stealing bases. When you finish them, explain them to a friend who is working on page 58.

1. What is the rule for multiplying a whole number by 10? By 100? By 1000? Use this rule with the numbers: 4, 32, 128, and 2,473.

2. What is a quick way to multiply a decimal by 10? By 100? By 1000? Use this rule with the numbers: 3.2, .163, 5.45, and 1.728.

3. A quick way to multiply a number by 25 is to multiply the number by 100, and divide this product by 4. Use this quick way to multiply 188 by 25. Check by multiplying the long way.

4. A quick way to multiply a number by $33\frac{1}{3}$ is to multiply the number by 100, and divide this product by 3. Explain why this rule works.

5. Discover a quick way to multiply a number by $16\frac{2}{3}$. Use this way to multiply 252 by $16\frac{2}{3}$.

Find these products the quick way.

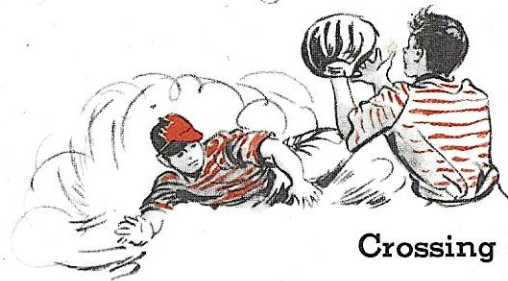
$$6. 25 \times 144 \quad 33\frac{1}{3} \times 144 \quad 16\frac{2}{3} \times 144$$

$$7. 50 \times 216 \quad 75 \times 216 \quad 12\frac{1}{2} \times 216$$

$$8. 888 \times 25 \quad 37\frac{1}{2} \times 64 \quad 83\frac{1}{3} \times 36$$

$$9. 480 \times 75 \quad 14\frac{2}{7} \times 140 \quad 28\frac{4}{7} \times 420$$

$$10. 472 \times 50 \quad 360 \times 66\frac{2}{3} \quad 480 \times 87\frac{1}{2}$$



Crossing Home Plate

Find the answers.

1. 10% of \$50 25% of 60 lb.
2. 50% of \$25.30 14% of 75 in.
3. 45% of \$1240 56% of 1248 ft.
4. $66\frac{2}{3}\%$ of \$900 $16\frac{1}{2}\%$ of 96 gal.
5. 3% of \$4155 1% of 320 rd.
6. The Smith Clothing Store is selling all goods at a discount of 20%. What is the sale price of a tablecloth whose regular price was \$5?
7. The regular price of a rug is \$15. At a sale, the price is 15% less. How much can one save by purchasing the rug at the sale?
8. Mr. Brown receives a commission of 5% on all sales. What is his commission on a sale of \$59?
9. Bob received a commission of $12\frac{1}{2}\%$ on a sale of \$5256. How much was his commission?
10. Jack expected to sell his potatoes at an average price of \$2 a bushel. The average price was 5% less than he had expected. What was the actual average price?
11. How much did Jack get for his potatoes if he sold a total of 184 bu.?
12. The regular price of a suit is \$42. If there is a discount of $33\frac{1}{3}\%$, what is the reduced price?



Unit Three

Do You Know How to Spend Your Money?

Make up and solve a problem about each of the following.

1. *Compare prices before you buy.* One store sells peaches at 3 lb. for 29¢; a second store sells peaches of the same kind at 6 lb. for 59¢. I want 12 lb. of peaches.
2. *Buy things when they are in season.* Strawberries are 45¢ a quart in May and 20¢ a quart in June. Mother bought 48 quarts of strawberries for jam.
3. *Be sure things are of good quality.* Half the ears of corn at 30¢ per dozen are unfit for use. All the corn at 40¢ per dozen can be used.
4. *It may pay to buy in larger quantities.* Potatoes are \$2 a bushel or 5 lb. for 24¢.
5. *Buy at sales at responsible stores.* At sales the price of clothing is 25% less.



Developing Power in Problem Solving

No pencils, please.

1. Albert walked four miles in the morning and three miles in the afternoon. How many miles did he walk in all?
2. Susan walked three miles a day for five days. How many miles did she walk in all?
3. Henry has the same number of oranges in each of three bags. If he has fifteen oranges in all, how many are in each bag?
4. Mary had eighteen cookies and gave nine to Ann. How many were left?
5. John had fifteen nuts in a bag. He ate some of them and found that he had only nine nuts in the bag. How many had he eaten?
6. Sally is making a trip of twelve miles. If she has already gone four miles, how many more miles does she have to go?
7. Ann made six rows of cross-stitches with eight cross-stitches in each row. How many cross-stitches did she make in all?
8. Howard ate nine pieces of candy and Harry ate six pieces of candy. How many pieces of candy did they both eat?
9. Grace ate four pieces of candy and Bill ate three times as much. How many did Bill eat?

You may use pencils for these.

10. A man drove 386 miles one day and 417 miles the next day. How many miles did he drive in the two days?
 11. Fred drove 347 miles a day for 28 days. How many miles did he drive in all?
 12. There are 50,797 pupils enrolled in 79 schools. Find the average number per school.
 13. Mr. Cook had \$12,500 and used \$7,750 to buy a home. How much did he have then?
 14. There are about 7,000 grains of wheat in a pound. About how many grains of wheat are in a bushel?
 15. There are 50,797 pupils in the city schools. Of these, 24,619 are boys. How many are girls?
 16. How long will it take one to drive 646 miles at an average speed of 38 miles an hour?
 17. A farmer sold 16,183 lb. of milk in June and 17,086 lb. in July. How many more pounds did he sell in July than in June?
- I. Write the numbers 1 - 17 in a column.
 - II. After each number write the answer you found for the problem of that number.
 - III. After each number write what you did (add, subtract, multiply, divide) to find the answer.
 - IV. After each number write the sign (+, -, $\times$, $\div$) of the process you used.

I	II	III	IV
1.	7	Add	+
2.			

Using Formulas to Solve Problems

1. Mr. Jones drove 6 hours at an average rate of 37 miles an hour. How far did he drive?

Let d stand for the distance Mr. Jones drove; r stand for the rate in miles per hour; and t stand for the time in hours. We have the formula:

$$d = r \times t, \text{ and } d = 37 \times 6 = 222$$

The answer is 222 miles.

2. Mrs. Jones drove 7 hours at the average rate of 38 miles per hour. Use the formula, $d = r \times t$, to find how many miles Mrs. Jones drove.

Use the formula to find the distance, d , in miles. The rate, r , is in miles per hour, the time, t , is in number of hours.

	3.	4.	5.	6.	7.	8.	9.	10.
r	43	56	$35\frac{1}{2}$	54	47	28	39	44
t	8	3	6	$8\frac{1}{3}$	9	$2\frac{1}{2}$	5	7

11. Mr. Smith drove 216 miles in 6 hours. What was his average rate in miles per hour?

The average rate in miles per hour is given by the formula:

$$r = \frac{d}{t}, \text{ and } r = \frac{216}{6} = 36$$

The answer is 36 miles per hour.

Use the formula to find r when d and t are given as follows:

	12.	13.	14.	15.	16.	17.	18.
d	215	312	203	207	260	154	261
t	5	6	7	$4\frac{1}{2}$	8	$2\frac{3}{4}$	9

19. Mr. Brown needs to make a trip of 245 miles. If he can drive an average of 35 miles per hour, how many hours will it take him to make the trip?

The time is given by the formula:

$$t = \frac{d}{r}, \text{ and } t = \frac{245}{35} = 7$$

The answer is 7 hours.

20. Another time Mr. Brown needed to drive 193 miles. If he could drive an average of 38 miles an hour, how many hours did it take him to make the trip? Use the formula, $t = \frac{d}{r}$.

Use the formula to find t when d and r are given as follows:

	21.	22.	23.	24.	25.	26.	27.
d	308	296	150	300	204	220	200
r	36	37	45	$33\frac{1}{3}$	48	44	32

28. An airplane flew 552 miles in 3 hours. What was its average rate in miles per hour? What formula could you use to solve this problem?

29. Another airplane flew $2\frac{1}{2}$ hours at the average rate of 284 miles an hour. How many miles did it fly? What formula could you use to solve this problem?

30. Ted can fly his training plane at the rate of 116 miles an hour. At this rate how many miles can he fly in $1\frac{3}{4}$ hours? What formula could you use to find the answer to this problem?



Working on Commission

Mr. Jones sells real estate. He does not receive a salary, but is paid a certain per cent of each sale that he makes. This per cent is called his **rate of commission**, and the amount of money he receives is his **commission**. The amount left from the sale after the commission has been paid is called the **net proceeds** of the sale.

1. Mr. Jones sold a house for \$7000. If his rate of commission was 3%, what was the amount of his commission? What were the net proceeds?

2. On a sale of \$51,500 his rate of commission was 2%. What was his commission? His proceeds?

3. Tom Smith collects rent for others. He charges 2% commission. Last month he collected \$8,750. What was his commission?

Find the amount of the commission and the net proceeds of each sale. Rate of commission and the amount of the sale are given below.

4. 5%; \$24,300

8. 15%; \$500

5. $12\frac{1}{2}\%$; \$2.40

9. 4%; \$11,075

6. 20%; \$1.50

10. 30%; \$15

7. 9%; \$200

11. 8%; \$550

12. What are the advantages of paying a salesman a commission rather than a salary? Why do some stores pay a salary and a commission?

A Short Way to Find Net Proceeds

1. Mr. Mills pays his salesmen 5% commission for selling radios. This is the way he finds the net proceeds of a sale of \$375. Explain.

<i>The whole is</i> 100%	<i>Amount of sale</i> \$375
<i>The rate is</i> 5%	<i>x.95</i>
<i>Net proceeds</i> 95%	<u>1875</u>
	<u>3375</u>

Net proceeds \$356.25

2. He pays 15% commission on electric irons. Find the net proceeds of sales amounting to \$950.

3. Mr. Mills pays $12\frac{1}{2}\%$ commission for selling electric fans. This is the way he finds the net proceeds of sales amounting to \$960. Explain.

<i>The whole is</i> $\frac{8}{8}$	
<i>The rate is</i> $\frac{1}{8}$	$\frac{7}{8} \times \frac{120}{1} = \$840$
<i>Net proceeds</i> $\frac{7}{8}$	

4. What would have been the net proceeds from the sale of \$960 worth of electric fans if the rate of commission had been $16\frac{2}{3}\%$?

Find the net proceeds, to the nearest cent, of the following sales.

5. \$5900, 3%

8. \$400, $2\frac{1}{2}\%$

6. \$60, 14%

9. \$.75, 10%

7. \$900, $33\frac{1}{3}\%$

10. \$1200, $8\frac{1}{3}\%$

11. Do Problems 1 - 11, page 66 the short way.



Discounts and Net Prices

At an after-Christmas sale all toys were sold for 35% less than the marked price, or regular price. The reduction, or amount taken from the

regular price, is called the **discount**. The marked down price may be called the **net price**.

1. Mrs. May bought a bear. The regular price had been \$15. What was the net price?

<i>Regular price</i>	<i>\$15.00</i>	<i>Regular price</i>	<i>\$15.00</i>
<i>Rate of discount</i>	<i>x.35</i>	<i>Discount</i>	<i>5.25</i>
	<i>75 00</i>	<i>Net price</i>	<i>\$9.75</i>
	<i>450 0</i>		
<i>Discount</i>	<i>\$5.2500 or \$5.25</i>		

2. How can the store afford to give Mrs. May such a large discount?

3. Billy bought a sled that was marked \$8, discount 35%. What did he pay for the sled?

4. Joan bought a doll that was marked \$6.40. How much did she have to pay for it?

Find discount and net price. Regular price and rate of discount are given.

- | | |
|----------------|------------------------------|
| 5. \$17.50, 2% | 8. \$1680, $12\frac{1}{2}\%$ |
| 6. \$.75, 6% | 9. \$6.50, 8% |
| 7. \$150, 25% | 10. \$19.75, 20% |

A Short Way to Find Net Price

1. A ball that was marked to sell for \$9.95 is on sale at a 30% discount. Find the net price. Explain.

<i>Marked price</i>	<i>100%</i>	<i>Marked price</i>	<i>\$9.95</i>
<i>Rate of discount</i>	<i>30%</i>		<i>x.70</i>
<i>Net price</i>	<i>70%</i>	<i>Net price</i>	<i>\$6.9650</i>

The sale price of the ball is \$6.97.

2. The regular price of a sweater is \$4.75. The discount is 40%. What is the net price?

3. A pair of skates is marked \$5, discount 40%. Another pair of skates is marked \$6, discount 55%. Which net price is smaller?

4. Andy bought a 10-dollar tennis racket at a discount of 20%. How much did he have to pay?

The whole is $\frac{5}{5}$

The discount $\frac{1}{5}$

Net price $\frac{4}{5}$

$$\frac{4}{5} \times \frac{2}{1} \times \frac{\$10}{1} = \$8.$$

5. How much would Andy have had to pay for the racket if the discount had been $12\frac{1}{2}\%$?

Use the short way to find the following discounts and net prices. The regular prices and the rates of discounts are given.

- | | |
|-------------------------------|------------------------------|
| 6. \$260, 40% | 10. \$150, 25% |
| 7. \$14.40, $12\frac{1}{2}\%$ | 11. \$132, $16\frac{2}{3}\%$ |
| 8. \$1650, $33\frac{1}{3}\%$ | 12. \$64, $37\frac{1}{2}\%$ |
| 9. \$3360, $6\frac{1}{4}\%$ | 13. \$97, 50% |

Finding More than the Whole

1. Tom's scout troop is asked to raise $\frac{1}{4}$ more money this year than they raised last year. They raised \$124 last year. How much must they raise this year?

Last year: $\frac{4}{4}$, or \$124

Increase: $\frac{1}{4}$, or \$31

This year: $\frac{5}{4}$, or \$155

Short Way
 $\frac{4}{4} + \frac{1}{4} = \frac{5}{4}$

$$\frac{5}{4} \times \frac{\cancel{124}^{31}}{1} = \$155$$

2. Last year there were 20 boys in the troop. This year the troop is $\frac{1}{5}$ larger than last year. How many are in the troop this year?

3. Tom sold 30 tickets at \$.35 each. Billy sold $\frac{1}{6}$ more tickets than Tom. How much did Billy collect for the tickets he sold?

4. The troop bought 150 lb. of peanuts at 8¢ a pound. They sold them so as to gain $\frac{2}{3}$ the cost price. For how much did they sell them?

5. Betty made 12 lb. of candy to sell at the troop's entertainment. Ruth made $\frac{5}{6}$ more candy than Betty. How much did Ruth make? If the boys sold the candy at 75¢ a pound, how much did they get for the candy that Betty and Ruth made?

6. Last year boiled ham cost 40¢ a pound. This year the price was $\frac{3}{8}$ more than last year. Find the cost of 15 lb. of ham this year.

Finding More than 100%

1. There were 30 girls in Betty's scout troop last year. This year the membership is 40% more than last year. How many are in the troop now?

Last year: 100%, or 30

Increase: 40%, or 12

This year: 140%, or 42

Short Way

$$100\% + 40\% = 140\%$$

$$1.40 \times 30 = 42.00$$

2. If the membership in Betty's troop had increased 30%, how many would be in it this year?

3. The troop gave a dinner to raise money for a radio for their scout house. A child's ticket was 80¢, and an adult ticket was 30% more. How much was an adult ticket?

4. Betty sold 36 tickets. Ruth sold $16\frac{2}{3}\%$ more tickets than Betty. How many tickets did Ruth sell?

5. The total from adult tickets was \$84.50. The total from children's tickets was 56% more than from adult tickets. How much did they get in all?

6. The troop had expected to pay \$68 for a radio. Since they made more on the dinner than they expected, they decided to buy a combination radio and record player. This cost 75% more than the radio alone. What did it cost?

7. The girls had expected to sell about 150 tickets in all. They actually sold 70% more than they expected. How many did they sell?

Finding Profit or Loss

1. Mr. West bought a used truck for \$575. He sold it for \$725. How much did he make?

When selling price is more than cost:

$$\text{Selling Price} - \text{Cost} = \text{Profit} \quad \$725 \text{ Selling price} \\ -575 \text{ Cost}$$

COST		PROFIT
Selling Price		\$150 Profit

2. Mr. North bought a used truck for \$575. He sold it for \$500. How much did he lose?

When cost is more than selling price:

$$\text{Cost} - \text{Selling Price} = \text{Loss} \quad \$575 \text{ Cost} \\ -500 \text{ Selling price}$$

SELLING PRICE	LOSS
Cost	\$ 75 Loss

3. Ann made a sweater and sold it to Betty for \$2. If the materials cost \$3.60, how much did Ann lose?

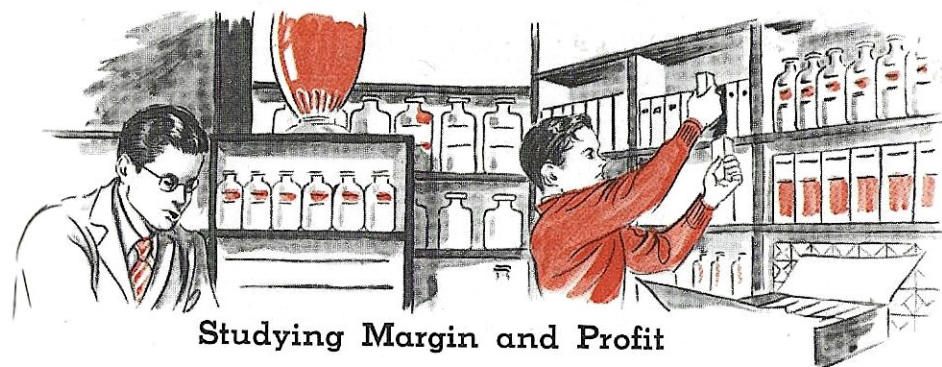
4. Mrs. Smith paid \$45 for a lamp. When she found it did not look well with the other furnishings, she sold it for \$32.50. If she paid \$.75 to advertise the lamp for sale, what was the total cost of the lamp? What was her loss?

5. If Mrs. Smith had been able to sell the lamp for \$60, what would have been her profit?

$$\text{Total Cost} = \text{First Cost} + \text{Other Expenses}$$

$$\text{Total Cost} - \text{Selling Price} = \text{Loss, or}$$

$$\text{Selling Price} - \text{Total Cost} = \text{Profit.}$$



Studying Margin and Profit

Jim noticed that Mr. Newton paid 19¢ a tube for toothpaste and sold it for 39¢ a tube. Mr. Newton explained that the difference, 39¢ - 19¢ = 20¢, was not profit. He had to pay for rent, heat, light, and wages. These are called operating expenses, or **overhead**. The overhead plus the profit is called the **margin**.

Selling Price, 39¢

Margin, 20¢

FIRST COST 19¢	MARGIN 20¢
----------------	------------

OVERHEAD + PROFIT

1. If Mr. Newton buys hand lotion for \$.36 a bottle and sells it for \$.50, what is his margin?

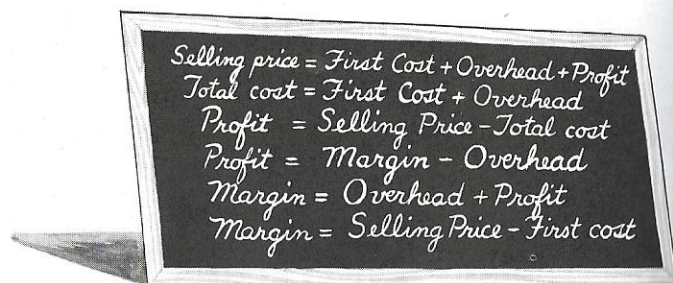
2. If the overhead on a bottle of hand lotion is 10¢, what is the profit?

3. Mr. Newton pays 60¢ a box for face powder and sells it for \$1. What is the margin?

4. If 15% of the selling price of face powder is profit, how much is the profit? How much is the overhead?

5. Mr. Newton paid \$7.85 for an electric razor. If the overhead was \$1.90, what was the total cost?

6. For how much must he sell the razor to make a profit of \$1.75?



Problems About Profits

Read the problem carefully. Decide which of the formulas above can be used.

1. A sweater cost \$3.95 and is sold for \$5.85. What is the margin?
2. Harry bought a radio for \$6. He paid \$1 for new tubes and 65¢ for a cord and plug. What was the total cost?
3. Mr. Newton paid \$6 for a case of soap. He estimated the overhead would be \$3.75, and he wished to make a profit of \$2.25. For how much must he sell the soap? If there are 10 dozen bars in the case, for how much must he sell each bar?
4. Mr. Best bought a car for \$615. He set the selling price so that his margin would be $33\frac{1}{3}\%$ of the cost. What was the selling price?
5. Mr. Drake sold a refrigerator for \$240. This price included a profit of 15% of the selling price. If the first cost was \$170, how much was the overhead?
6. A dealer bought a stove for \$63 and sold it for \$89.95. The overhead was \$10.45. What was the profit?

Comparing Numbers

1. Tom had \$5 and spent \$3. What part of his money did he spend?

$$\frac{3}{5} = \frac{3}{5}$$

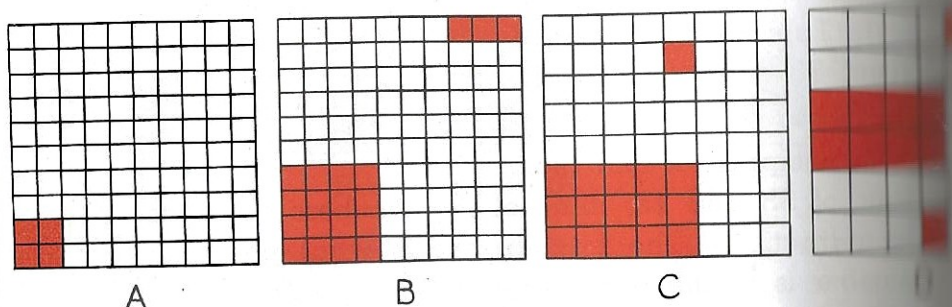
To compare or find the ratio of \$3 and \$5, think of the numbers as terms of a fraction. The fraction shows what part one number is of the other.

2. If Tom had spent \$4, what part of his money would he have spent?
3. Mary had 40¢ and spent 25¢ for a comb. What part of her money did she spend?
4. Jerry's team played 15 games and won 9 of them. What part of the games did they win? What part did they lose?
5. Billy's team played 16 games, and won 14 of them. What part of the games did they win? What per cent was this? Explain.

$$\frac{14}{16} = \frac{7}{8} \qquad \frac{7}{8} = \frac{87\frac{1}{2}}{100} = 87\frac{1}{2}\%$$

To change a common fraction to a decimal, divide the numerator by the denominator.

6. If Billy's team had won 10 games out of 16, what per cent would they have won?
7. A dealer bought 144 dresses. He sold 18 of them in one day. What per cent did he sell that day?



Finding Per Cents

1. How many small squares are in large Square A? How many of these are colored? What per cent of A is colored?
2. What per cent of B is colored?
3. What per cent of C is colored?
4. What per cent of D is colored?
5. A walk is 4 ft. wide and 12 ft. long, and is paved with square stones a foot on a side. Twelve of the stones have been broken. Use the scale, 1" = 2', and make a drawing of the walk. Shade the stones that are broken. What percentage of the stones are broken?
6. Mr. Hill bought a 45-dollar suit for \$18 less than the marked price. What was the percentage of discount?
7. Bill bought a bat for \$1.50 and sold it for 30¢ less than it cost. What was his per cent of loss?
8. Sue had 60 caramels and ate 16 of them. What per cent did she eat?

Two Ways of Finding Per Cents

1. Jack had \$300 and spent \$25. What per cent of his money did he spend? Explain.

One Way

$$\frac{25}{300} = \frac{1}{12} = 8\frac{1}{3}\%$$

Other Way

$$.08\frac{1}{3} = 8\frac{1}{3}\%$$

$$\begin{array}{r} \$300 \overline{) \$25.00} \\ \underline{24 \ 00} \\ 100 \end{array}$$

Divide part by whole to find per cent.

Find what per cent the red number is of each number in the same row.

2.	34	60	48	144	240	300	12
3.	32	40	48	80	240	640	8
4.	20	25	50	100	120	200	5
5.	18	30	75	150	450	600	15
6.	28	40	50	75	400	500	25
7.	24	32	48	96	256	480	16
8.	72	90	27	144	270	720	18
9.	30	36	42	240	480	264	24
10.	40	48	80	128	320	480	32
11.	42	48	54	144	180	270	36
12.	48	50	60	80	100	180	40
13.	60	72	80	96	144	120	48
14.	60	75	80	100	125	150	50
15.	63	72	90	162	216	270	54
16.	63	70	64	84	140	168	56
17.	78	80	90	100	120	180	60
18.	80	96	72	100	128	160	64

Finding the Whole from a Part

1. One day, $\frac{1}{4}$ of Tom's scout troop or 9 boys were absent. How many are in the troop?

$\frac{1}{4}$ or nine boys	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$
-------------------------------	---------------	---------------	---------------

$\frac{1}{4}$, or how many boys?

One Way

$$\frac{1}{4} \text{ of troop} = 9 \text{ boys}$$

$$\frac{4}{4} \text{ of troop} = 4 \times 9 \text{ boys}$$

$$= 36 \text{ boys}$$

Another Way

$$9 \div \frac{1}{4} =$$

$$9 \times \frac{4}{1} = 36$$

Ans. 36 boys

2. The Girl Scouts gave a play. There were 375 persons present. This was $\frac{3}{4}$ of those who had bought tickets. How many bought tickets?

$\frac{1}{4}$	$\frac{3}{4}$ or 375 persons	$\frac{1}{4}$	$\frac{1}{4}$
---------------	------------------------------	---------------	---------------

$\frac{3}{4}$, or how many persons?

$$375 \div \frac{3}{4} = \overset{125}{375} \times \frac{4}{3} = 500 \text{ persons}$$

3. Tom's troop won 10 games. This was $\frac{2}{5}$ of the games played. How many games were played?

Find the number that belongs in place of each ?

4. 16 is $\frac{8}{9}$ of ?

6. 14 is $\frac{7}{10}$ of ?

5. 15 is $\frac{3}{20}$ of ?

7. 160 is $\frac{4}{5}$ of ?

Finding the Whole from a Percentage

1. On a rainy day, only 75% of the pupils of the Lowell School were present. If 300 pupils were present, how many pupils are there in all?

75% or 300 pupils	
-------------------	--

100%, or how many pupils?

Using Fractions

$$300 \div \frac{75}{100} =$$

$$\overset{4}{300} \times \frac{100}{75} = 400$$

Using Decimals

$$\begin{array}{r} 400 \\ .75 \overline{)300.00} \\ \underline{300} \\ 00 \end{array}$$

2. Mrs. Brown paid the grocer \$15. This was 25% of what she owed him. What did she owe?

3. Bill bought a bat at 45¢ less than the regular price. This was a discount of 30% of the regular price. How much did Bill pay for the bat?

4. Mr. Hale paid \$4 for the rent of money for a year. If \$4 is 5% of the amount he borrowed, how much did he borrow?

Find the number that belongs in place of each ?

5. 10 is 5% of ?

11. 25% of ? is 50

6. 160 is 8% of ?

12. 50% of ? is 32

7. 48 is 4% of ?

13. 75% of ? is 225

8. 24 is 6% of ?

14. 40% of ? is 100

9. 18 is 3% of ?

15. $16\frac{2}{3}\%$ of ? is 50

10. 21 is 7% of ?

16. $33\frac{1}{3}\%$ of ? is 36

Percentage Formulas and Problems

1. Mr. Barnes borrowed \$200 for one year. He paid 6% of the \$200 for the use of the money. How much was this?

The problem gives you the whole, $\$200$; the rate, 6%; and asks you to find the part. Use the formula:

$$\text{Part} = \text{Rate} \times \text{Whole.}$$

2. Mr. Carr said he paid \$15 for the use of \$300 for one year. What rate (per cent) did he pay?

The problem gives you the whole, \$300; the part, \$15; and asks you to find the rate. Use the formula:

$$\text{Rate} = \frac{\text{Part}}{\text{Whole}}$$

3. Mr. Davis said he borrowed money and paid for it at the rate of 4%, and that he paid \$16. What was the amount of the loan?

The problem gives you the part, \$16; the rate, 4%; and asks you to find the whole. Use the formula:

$$\text{Whole} = \frac{\text{Part}}{\text{Rate}}$$

Choose the formula that applies, and find the missing number.

- | | |
|--------------------|--------------------|
| 4. 15 is ? % of 40 | 7. 55% of 200 is ? |
| 5. 150 is 30% of ? | 8. 12% of 425 is ? |
| 6. 45 is 5% of ? | 9. 9 is ? % of 72 |

Using the Percentage Formulas

Find:

- | | | |
|----------------------------|---------------|------------------------------|
| 1. 3% of \$480 | 65% of \$525 | 25% of \$12.80 |
| 2. 38% of 895 | 23% of 900 | $83\frac{1}{3}\%$ of \$18.30 |
| 3. 91% of 720 | 105% of 640 | $16\frac{2}{3}\%$ of \$42 |
| 4. $12\frac{1}{2}\%$ of 56 | 125% of \$400 | $87\frac{1}{2}\%$ of \$168 |

5. Write the formula you used in solving Problems 1 - 4 above.

- | | |
|-------------------|-----------------|
| 6. 6 is ?% of 8 | 45 is ?% of 150 |
| 7. 18 is ?% of 63 | 19 is ?% of 380 |
| 8. 30 is ?% of 45 | 21 is ?% of 56 |
| 9. 34 is ?% of 60 | 50 is ?% of 900 |

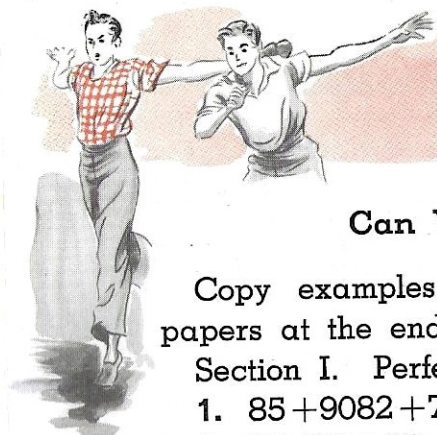
10. Write the formula you used in solving Problems 6 - 9 above.

- | | |
|---------------------|-----------------------------|
| 11. 16 is 4% of ? | 36 is 40% of ? |
| 12. 18 is 5% of ? | 124 is 31% of ? |
| 13. 160 is 80% of ? | 90 is 60% of ? |
| 14. 80 is 25% of ? | 6 is $33\frac{1}{3}\%$ of ? |

15. Write the formula you used in solving Problems 11 - 14 above.

Read a problem below carefully. Decide which formula applies. Then solve the problem.

16. Tom spent \$15. This was 4% of all the money he had. How much money did he have?
17. Mary had \$455 in the bank, and spent 5% of it. How much did she spend?
18. Ann had \$140 and spent \$4.20. What per cent of her money did she spend?



Can You Hit a Homer?

Copy examples and follow the signs. Mark papers at the end of each section.

Section I. Perfect Score = Safe on **First Base**

1. $85 + 9082 + 783 + 69 + 5 + 47243$
2. $37,428 + 36,408 + 3,256,390 + 15 + 465$
3. $\$15 + \$.56 + \$.04 + \$1,255 + \$.47 + \$18$
4. $4,239 + .534 + .466 + 4.257 + 536.2 + 9$

Section II. Perfect Score = Safe on **Second**

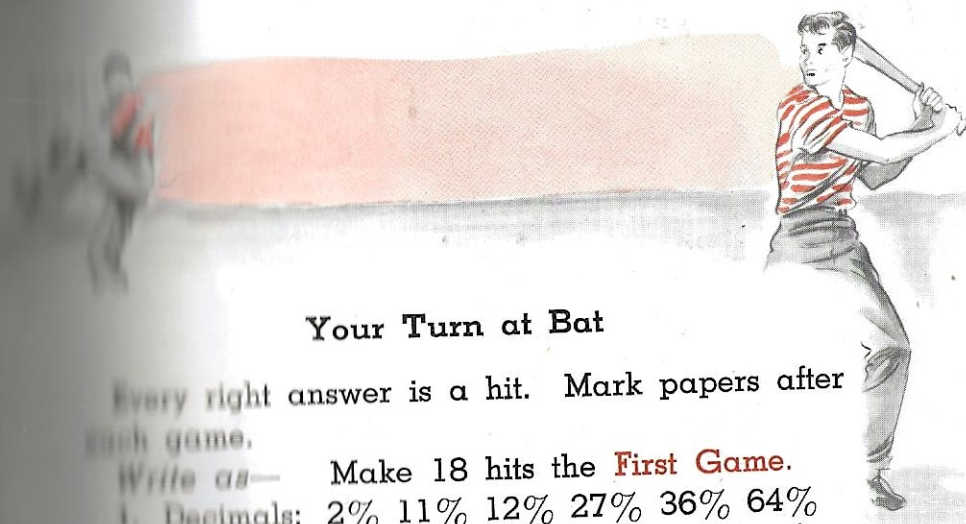
5. $9000 - 3$ $1397 - 4.5$ $15.283 - 6.4$
6. $1728 - 337.2$ $\$5 - \$3.05$ $\$529 - \$1.75$
7. $600 - .247$ $.574 - .253$ $\$59.87 - \$15$

Section III. Perfect Score = Safe on **Third**

8. 85×409 $3.5 \times \$7.59$ 1000×200
9. 4005×398 $4.2 \times \$1980$ 50×3200
10. $41 \times \$6.52$ $43 \times .5342$ $.5 \times 3.1416$
11. 45001×53 587×62.5 3006×200

Section IV. Perfect Score = Safe at **Home**

12. $30 \overline{)2940}$ $40 \overline{)\$39.60}$ $80 \overline{)\$38.60}$
13. $56 \overline{)4423}$ $47 \overline{)5896}$ $13 \overline{)\$12.35}$
14. $27 \overline{)6094}$ $1.2 \overline{).144}$ $42 \overline{)39900}$
15. $19 \overline{)14.307}$ $.015 \overline{).255}$ $.015 \overline{).255}$
16. $231 \overline{)11088}$ $2.31 \overline{)11088}$ $728 \overline{)93641}$



Your Turn at Bat

Every right answer is a hit. Mark papers after each game.

Write as— Make 18 hits the **First Game**.

1. Decimals: 2% 11% 12% 27% 36% 64%
2. Fractions: 5% 8% 10% 20% 75% $83\frac{1}{3}\%$
3. Per Cents: $\frac{1}{4}$ $\frac{2}{3}$ $\frac{4}{5}$ $\frac{5}{8}$ $\frac{1}{2}$ $\frac{9}{20}$

Make 8 hits the **Second Game**.

4. 10% of 50 is ? 15% of 60 is ?
5. 4 is ?% of 18 5 is 10% of ?
6. 3 is ?% of 12 2 is ?% of 10
7. ? is 5% of 200 ? is 12% of 25

Solve— Make 4 hits in **Third Game**.

8. A 5-dollar chemistry set was placed on sale at \$3.75. What was the rate of discount?

9. Mary got 35 words right on a spelling test and made a grade of 70%. How many words were there in the whole test?

10. Mr. Winn bought an electric fan for \$9.60 and sold it for \$12. What was the margin?

11. If the overhead on the fan was 40¢, what was the profit?

If you made a total of 27 or more hits, work on page 85. Others will find help on page 84.



Base Coaching

1. Find: $\frac{1}{2}$ of 32; .5 of 32; 50% of 32.
2. Find: $\frac{1}{3}$ of 45; $.33\frac{1}{3}$ of 45; $33\frac{1}{3}\%$ of 45
3. Find: $\frac{3}{4}$ of 48; .75 of 48; 75% of 48.

What is the number, if

4. $\frac{1}{2}$ of it is 15; 50% of it is 15
5. $\frac{2}{3}$ of it is 12; $.66\frac{2}{3}$ of it is 12
6. .75 of it is 18; 75% of it is 18

Find the value of the ?.

- | | |
|-----------------------------------|-------------------------------|
| 7. 15 = ?% of 40 | 30 = ?% of 90 |
| 8. 14 = ?% of 42 | 7 = ?% of 28 |
| 9. 17 = ?% of 85 | 2.5 = ?% of 7.5 |
| 10. 100% of 50 = ? | 11% of \$45 = ? |
| 11. $33\frac{1}{3}\%$ of 96 = ? | $16\frac{2}{3}\%$ of 63 = ? |
| 12. 150% of \$500 = ? | 91% of \$400 = ? |
| 13. $87\frac{1}{2}\%$ of \$32 = ? | $6\frac{1}{4}\%$ of \$480 = ? |
| 14. 19 = 5% of ? | 240 = 50% of ? |
| 15. 120 = 60% of ? | 288 = 96% of ? |
| 16. 115 = 25% of ? | 75 = 6% of ? |
| 17. \$24 = $66\frac{2}{3}\%$ of ? | \$756 = 84% of ? |
| 18. 14% of \$750 = ? | 18 = ?% of 30 |
| 19. 12 = 60% of ? | $83\frac{1}{3}\%$ of 66 = ? |
| 20. 42 = ?% of 60 | 90 = 75% of ? |
| 21. 27 = $37\frac{1}{2}\%$ of ? | 29 = ?% of 116 |



Stealing Bases

When a common fraction is changed to a decimal, the division comes out evenly or it does not.

These fractions come out evenly:

$$\frac{1}{2} = .5, \quad \frac{3}{4} = .75, \quad \frac{5}{8} = .625.$$

These fractions do not come out evenly:

$$\frac{1}{3} = .142857\ldots \quad \frac{1}{13} = .076923\ldots$$

By carrying out the division, you will see that 142857 repeats itself again and again.

$$.142857142857142857142857142857142857$$

$$\frac{1}{7} = 7)1.000000000000000000000000000000$$

By dividing, find the number of decimal places you need to carry each of the following to find a number that repeats itself:

$$1. \frac{1}{17} \quad 2. \frac{1}{19} \quad 3. \frac{1}{23} \quad 4. \frac{1}{29}$$

These repeating decimals are interesting in another way, too.

$$1 \times .142857 = .142857$$

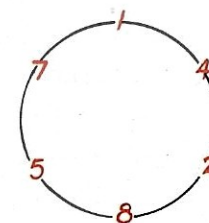
$$2 \times .142857 = .285714$$

$$3 \times .142857 = .428571$$

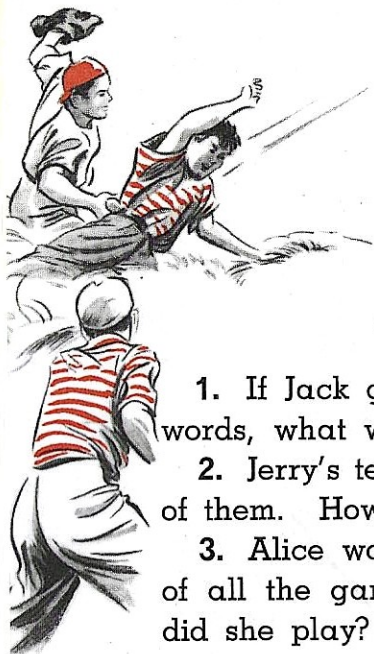
$$4 \times .142857 = .571428$$

$$5 \times .142857 = .714285$$

$$6 \times .142857 = .857142$$



By following around the circle, you can see that each of the red numbers has the same figure in the same order.



Crossing Home Plate

1. If Jack got 38 words correct on a test of 80 words, what was his grade?
2. Jerry's team played 24 games and won 75% of them. How many games did they win?
3. Alice won 14 tennis games. This was 70% of all the games she played. How many games did she play?
4. Jane spelled 47 words correctly and got a grade of 94%. How many words were there in all?
5. A dealer paid \$64.50 for a stove. He added \$5.50 for overhead and \$5 for profit. What was the selling price of the stove?
6. A dealer sold a refrigerator for \$205, making a profit of \$41. What percentage of the selling price was the profit?
7. The cash price of a refrigerator is \$280. If bought on an installment plan, the price is 8% more than the cash price. What is the installment price?
8. Mrs. High received a discount of 32¢ on her electric bill. This was 5% of the whole bill. How much was the whole bill?



Butterscotch Cookies

- 1/2 cup of butter
- 1-1/4 cups of brown sugar
- 1 egg
- 3/4 cup of pecans
- 1/2 teaspoon of vanilla
- 2 teaspoons of baking powder
- 1/8 teaspoon of salt
- 1/2 cup of flour

Unit Four

Cooking Problems

A good cook must use arithmetic. Materials must be measured exactly.

1. Ann wants to make six times as many cookies as her recipe will make. How much of each ingredient must she use?

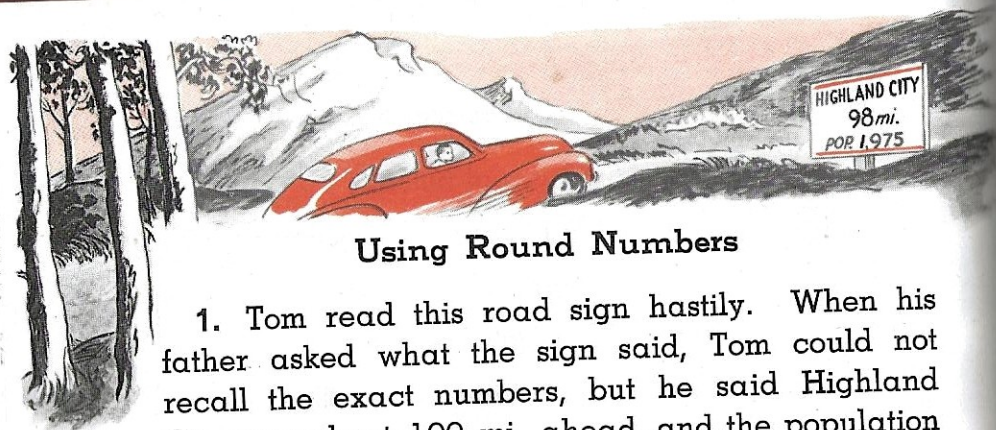
2. Bill wants to make five times as much punch as is called for in the following recipe:

- | | |
|-----------------------|-----------------------|
| 1 qt. cranberry juice | 1-1/4 c. orange juice |
| 1 c. pineapple juice | 2/3 c. lemon juice |
| 1 1/2 c. sugar | 1-1/2 c. water |

His mother told him that c. was the abbreviation for cup.

How much of each ingredient must he use?

Not counting the sugar as adding to the amount of punch, how many cups may Bill expect to have?



Using Round Numbers

1. Tom read this road sign hastily. When his father asked what the sign said, Tom could not recall the exact numbers, but he said Highland City was about 100 mi. ahead, and the population was about 2,000. Was Tom about right?

Sometimes it is not necessary to know the exact number. With large numbers, it is sometimes easier to give the whole hundred, or the whole thousand, or the whole ten thousand to which it is closest.

2. What is the nearest whole hundred for each of these numbers?

178 493 521 549 551 550 779 901

3. What is the nearest whole thousand for each of these numbers?

1,187 2,493 7,521 6,560 6,500 6,449

4. What is the nearest whole ten thousand for each of these numbers?

38,419 57,875 79,500 856,356 540,569 775,398

5. What is the nearest whole million for each of these numbers?

78,316,417 5,078,765 163,905,216 76,800,520

When actual figures in a number are replaced with zeros to obtain the nearest whole hundred, the nearest whole thousand, and so on, the number is given in round numbers.

6. Mount Everest is 29,141 ft. high. This height, rounded to the nearest thousand, is 29,000, or to the nearest ten thousand is 30,000.

In the first number every foot is counted. In the second number, the count is by 1000's. In the third number, the count is by 10,000's.

7. The greatest ocean depth is 35,400 ft. Round this number to the nearest thousand; to the nearest ten thousand.

8. The number of acres of farm land in the United States is as follows:

Crops	321,757,900	Pasture	267,992,295
Waste	76,490,496	Woodland	1,453,774,019

Round each number to the nearest million.

You can often use round numbers to estimate answers without using a pencil.

9. About how many bushels of wheat can be grown on 29 acres, if about 25 bu. can be grown on one acre? Think: 30×25 .

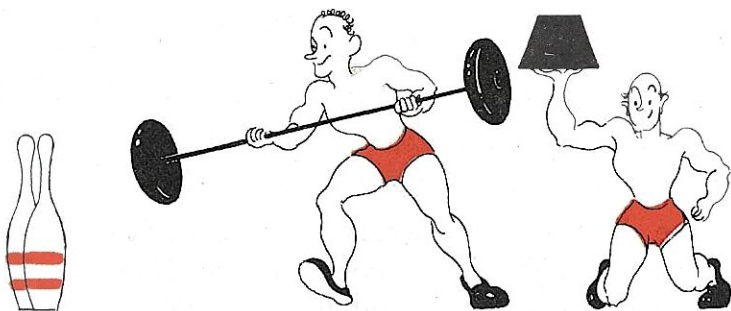
10. A loaded truck weighs 10,167 lb., and when empty weighs 5985 lb. What is the weight of the load? Think: 10,000 - 6,000.

Rounding a divisor may be a help in finding a quotient figure. Divide the following.

11. $38 \overline{)9376}$ Think: $40 \overline{)376}$

12. $696 \overline{)34565}$ Think: $700 \overline{)34565}$

13. $429 \overline{)149492}$ Think: $400 \overline{)149492}$



Developing Power in Problem Solving

Read each problem below carefully. Use round numbers and estimate what the answer should be. Do not solve the problem now. Tell which of the four red numbers is most reasonable for the answer.

1. Mrs. Kane bought a hat for \$3.95, and gave the clerk \$10. How much change should she get?

\$3 \$4 \$6 \$7

2. What is the cost of six pounds of meat at 49¢ a pound?

\$1 \$3 \$5 \$6

3. A rectangular rug is 9 ft. by 12 ft. What is the distance around it?

3 ft. 21 ft. 40 ft. 100 ft.

4. Harry weighs 118 lb. and Sam weighs 103 lb. What is the sum of their weights?

15 lb. 220 lb. 125 lb. 420 lb.

5. At 39¢ an hour, how much can Tom earn in 42 hr.?

\$2 \$4 \$16 \$12

6. Mr. Stone drove 243 mi. in 6 hr. About what was his average speed per hour?

4 mi. 14 mi. 40 mi. 400 mi.

7. Elmer feeds his dog half a can of meat a day. How many cans will he need for 30 days?

5 15 30 60

8. There were 1764 trees in a park. A storm blew 294 of them down. What part of the trees were blown down?

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\frac{1}{6}$

9. There were 72 words in a spelling test. Edwin missed 24 of them. What part did he miss?

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{1}{3}$ $\frac{1}{12}$

10. Janet weighs 59 lb. and her father weighs 177 lb. The father is how many times as heavy as Janet?

2 3 4 5

11. There are 17 rooms in a school, with an average of 38 pupils in a room. How many pupils are in the school?

380 650 760 1200

12. At 48 miles an hour, how many hours will it take to go 1152 mi.?

10 18 24 40

13. Dick had \$1123.14 and spent \$98.75. How much did he have left?

\$100 \$200 \$1000 \$2000

Write the numbers 1 - 13 in a column. After each number write (a) the answer you gave as reasonable for that problem; (b) what you would do to find the exact answer; (c) the exact answer.

Rounding Numbers with Fractions

Draw a line six inches long and mark the whole, half, quarter, and eighth inch points.

- Place your pencil at the $2\frac{1}{4}$ in. mark. To which whole inch is the pencil closest?
- Place your pencil at the $2\frac{1}{2}$ in. mark. The pencil is exactly midway between the 2-inch and the 3-inch mark. We round such a number as the next higher whole. We round $2\frac{1}{2}$ in. as 3 in.
- Place your pencil at these marks and tell to which whole inch it is closest:
 $3\frac{3}{4}$ $5\frac{1}{8}$ $3\frac{1}{2}$ $4\frac{3}{8}$ $1\frac{1}{4}$ $4\frac{1}{2}$ $1\frac{7}{8}$ $2\frac{5}{8}$
- A board is 4 ft. 8 in. long. What is its length correct to the nearest foot?
- The board is $\frac{7}{8}$ in. thick. What is its thickness correct to the nearest inch?
- A beef roast weighs 8 lb. 2 oz. What is its weight correct to the nearest pound? About what will it cost at 39¢ a pound?
- Estimate the cost of 11 lb. 14 oz. of ham at 28¢ a pound.
- Estimate the cost of 9 yd. 9 in. of carpet at \$3.80 a yard.
- A remnant of ribbon that was 7 yd. 28 in. long cost \$3.98. Estimate the cost per yard.
- Estimate the cost of $6\frac{5}{8}$ T. of coal at \$7.95 a ton.
- One recipe will make $6\frac{3}{4}$ doz. cookies. How many recipes are needed for 20 dozen?

Decimals in Baseball

- Jack's team won 5 games and lost 1. What part of the games, to thousandths, did they win?

$$\frac{\text{Part}}{\text{Whole}} = \frac{5 \text{ games}}{6 \text{ games}} = \frac{5}{6} =$$

$$\begin{array}{r} .8333 \text{ or } .833 \\ 6 \overline{) 5.000} \\ \underline{48} \\ 20 \\ \underline{18} \\ 20 \\ \underline{18} \\ 2 \end{array}$$

- Ann's team won 7 games and lost 5. What part of the games did they win?

In finding a quotient correct to thousandths, carry the division to four decimal places. If the fourth decimal figure is 5 or more, drop it and increase the thousandths figure by 1. If the fourth decimal figure is less than 5, just drop the fourth decimal figure.

- Check the standings given in the table below. Then copy and finish the table.

Team	Won	Lost	Standing
Brooklyn.....	29	14	.674
St. Louis.....	26	17	.605
Chicago.....	22	21	.512
Cincinnati.....	21	24	...
Boston.....	20	23	...
Pittsburgh.....	18	27	...
Philadelphia.....	18	28	...

- Arrange these softball teams according to their standing. Put the team with the highest standing at the top.

	Won	Lost
Bears.....	18	14
Lions.....	19	13
Hawks.....	12	20
Crows.....	15	17
Blues.....	16	16

Batting Averages

1. Sarah was at bat 7 times and hit the ball safely 3 times. What was her batting average?

$$\frac{\text{Hits}}{\text{Times at Bat}} = \frac{3}{7} = \frac{.4285 \text{ or } .429}{7 \overline{)3.0000}}$$

$$\begin{array}{r} 28 \\ \underline{20} \\ 60 \\ \underline{56} \\ 40 \\ \underline{35} \\ 5 \end{array}$$

Sarah has a batting average of .429.

2. Mary was at bat 9 times and hit the ball 4 times. What was her batting average?

3. Does Sarah or Mary have the higher batting average? How much higher?

The batting averages of Big League players are found in the same way. You divide the number of hits by the number of times at bat, and find the quotient correct to thousandths.

4. Find the batting average of each of these players. Copy the table with the players arranged in the order of their averages. Put the one with the highest average at the top.

	Times at Bat	Hits	Batting Average
Duke Miller.....	135	64	
Lefty Evans.....	109	48	
Strike-Out Howe.....	123	29	
Shorty Jones.....	141	63	
Pop Crane.....	118	41	
Ace Hill.....	145	37	



Can You Hit a Homer?

Get set for a four-bagger. Mark papers at the end of each section.

Section I. Perfect Score = Safe on **First Base**

Find the red percentage of each number in the row with it. Use fractions or decimals.

- | | | | | | | |
|---------------|-------|------|-----|----|------|----|
| 1. 10% | \$100 | \$75 | 900 | 60 | 37.5 | 80 |
| 2. 5% | \$400 | \$60 | 640 | 80 | 3240 | 70 |
| 3. 25% | \$160 | \$76 | 840 | 68 | 16.4 | 92 |
| 4. 50% | \$450 | \$84 | 198 | 46 | 76.8 | 36 |

Section II. Perfect Score = Safe on **Second**

- | | | | | |
|----------------------------|----|----|-----|----|
| 5. 18 is what per cent of: | 32 | 40 | 54 | 60 |
| 6. 14 is what per cent of: | 42 | 70 | 56 | 16 |
| 7. 36 is what per cent of: | 45 | 72 | 60 | 96 |
| 8. 60 is what per cent of: | 90 | 75 | 360 | 72 |

Section III. Perfect Score = Safe on **Third**

- | | |
|----------------------------------|------------------------------|
| 9. 10 is 50% of ? | 30 is 5% of ? |
| 10. 4 is 4% of ? | 25 is 25% of ? |
| 11. 50 is $83\frac{1}{3}\%$ of ? | 10 is $16\frac{2}{3}\%$ of ? |
| 12. 200 is 8% of ? | 320 is 16% of ? |

Section IV. Perfect Score = Safe at **Home**

- | | |
|----------------------------------|-----------------|
| 13. 124 is 8% of ? | 45% of 68 is ? |
| 14. $12\frac{1}{2}\%$ of 56 is ? | 15 is ?% of 40 |
| 15. 21 is ?% of 24 | 261 is 87% of ? |
| 16. 95% of 300 is ? | 48 is 16% of ? |

Per Cents Less than 1%

1. A store allows for a loss of $\frac{3}{4}\%$ in unpaid bills. If its sales last month were \$240,000, how many dollars will it allow for unpaid bills?

$$\frac{3}{4}\% = \frac{3}{4} \times \frac{1}{100} = \frac{3}{400}$$

$$\frac{3}{400} \times \overset{\$600}{\cancel{\$240000}} = \$1,800$$

2. One pound of a chemical is put into a tub containing 200 pounds of water. The chemical is what percentage of the water?

$$\frac{\text{Part}}{\text{Whole}} = \frac{1}{200} = \frac{.005}{200 \times 1.000} = .5\% = \frac{1}{2}\%$$

3. Mr. Hill spends \$5 a month for magazines. This is $\frac{5}{8}\%$ of his monthly salary. What is his monthly salary?

$$\frac{5}{8}\% \text{ of } \_ = \$5; \frac{5}{8}\% = \frac{5}{800}$$

$$\$5 \div \frac{5}{800} = \cancel{\$5} \times \frac{800}{5} = \$800$$

Write the number that belongs in each blank.

- | | |
|-------------------------------------|--------------------------------------|
| 4. $\frac{2}{3}\%$ of 840 = $\_$ | 11. $\frac{7}{8}\%$ of 840 = $\_$ |
| 5. $\_ \%$ of 1600 = 4 | 12. $\_ \%$ of 25,000 = 50 |
| 6. $\frac{3}{8}\%$ of $\_$ = 12 | 13. $\frac{5}{6}\%$ of $\_$ = 25 |
| 7. $\frac{1}{8}\%$ of \$2400 = $\_$ | 14. $\frac{5}{8}\%$ of \$2000 = $\_$ |
| 8. $\frac{1}{6}\%$ of 3600 = $\_$ | 15. $\frac{1}{4}\%$ of 1600 = $\_$ |
| 9. $\frac{3}{4}\%$ of $\_$ = 15 | 16. $\frac{1}{2}\%$ of $\_$ = 100 |
| 10. $\frac{1}{3}\%$ of 1800 = $\_$ | 17. $\frac{2}{3}\%$ of 1800 = $\_$ |

Per Cents More than 100%

1. Ross is 10% taller than he was three years ago. This means that his present height is 110% of his height three years ago. If he was 60 inches tall then, how tall is he now?

One Way

$$\begin{array}{r} 60 \text{ in.} + 10\% \text{ of } 60 \text{ in.} \\ 60 \text{ in.} \\ .10 \\ \hline 6.00 \text{ in.} \\ 60 \text{ in.} \\ \hline 66 \text{ in.} \end{array}$$

Another Way

$$\begin{array}{r} 110\% \text{ of } 60 \text{ in.} \\ 60 \text{ in.} \\ 1.10 \\ \hline 6.00 \\ 60 \\ \hline 66.00 \text{ in.} \end{array}$$

2. Mr. Hill had a salary of \$3000 a year and was given an increase of 20%. What was his new salary? Work in two ways.

3. Find 120% of 60; 135% of 60.

4. Find 240% of 25; 300% of 25.

5. Mr. Brown's present salary is \$375. This is a raise of 25% more than he was earning. What did he earn before his salary was raised? Explain:

$$100\% + 25\% = 125\% \text{ or } 1.25$$

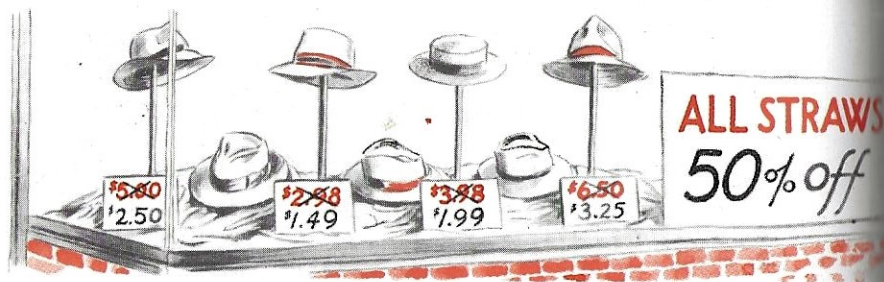
$$\begin{array}{r} \$ 300. \\ 1.25 \overline{) \$375.00} \end{array}$$

6. \$420 is 105% of what number?

7. \$500 is 125% of what number?

Write the number that belongs in each blank:

- | | |
|--------------------------|-----------------------|
| 8. 64 is $\_ \%$ of 40 | 80 is $\_ \%$ of 32 |
| 9. 600 is $\_ \%$ of 150 | 720 is $\_ \%$ of 300 |



All Straws 50% Off

1. Mr. Stone has a sale of straw hats every August. This year he is selling at a discount of 50%. Why do you think he has such a sale? What is the sale price of a hat if the regular price was \$1.98?

2. Just before closing time on Saturday, Mr. Taylor sells his ripest fruit at a discount. Why do you think he does this? Last week he sold 75-cent baskets of plums for 45 cents. He said this was a discount of 40%. Prove that he was right.

3. A boy's suit was priced at \$37.50. The sale price was 20% less. What was the sale price? Why do clothing stores have sales?

4. The Cut-Rate Drug Store has a monthly sale at which many standard items may be bought at discounts. The regular price of a large bottle of cod liver oil is \$3.50. It is marked, "30% Off for One Day Only." What is the sale price?

5. The usual price of a certain kind of chocolate bar is 5¢. At a special sale, one may buy the same chocolate bars at 3 for 10¢. What is the rate of discount? Check.

6. The regular price of canned soup is 15¢ a can. At a special sale, one may buy the same soup at 2 cans for 25¢. What is the rate of discount? Check.

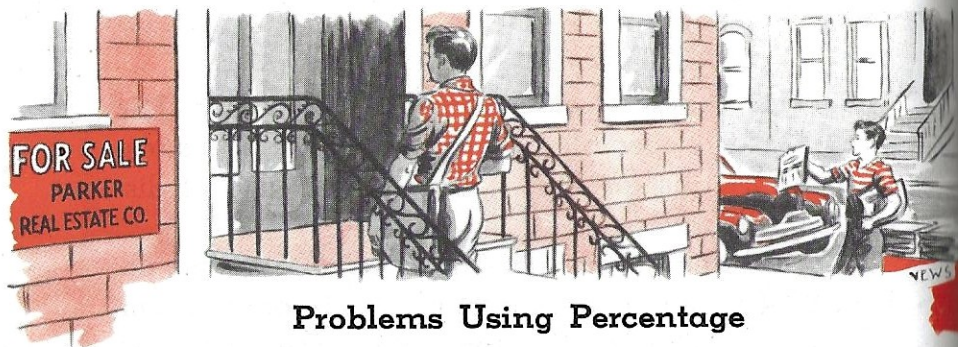
7. The electric bill in Tom's home last month was \$3.40 with a 5% discount if it is paid within 10 days. What is the amount of the discount? If the family can save that much each month by paying each bill within 10 days, how much can they save in a year? Why is the electric company willing to give such a discount?

8. The gas company also gives a 5% discount on any bill paid within 10 days. In Tom's family, the average monthly gas bill is \$4.80. How much can they save in a year by paying each gas bill within 10 days?

9. Many of the stores where Tom and his family buy things give discount stamps. The purchaser gets 1 stamp for each 10-cent purchase, and 5 of these stamps are worth 1 cent. Prove that this is equal to a discount of 2%.

10. In a year, Tom and his family buy about \$1500 worth of goods in stores that give discount stamps. If they save all the stamps, how much will they have saved in a year?

11. Tom's father sells books at the prices printed on their covers, but he is able to buy them for less. One book is priced to sell for \$2.50. Tom's father buys it for 40% less. How much does Tom's father pay for it?



Problems Using Percentage

1. Robert sells magazines at 15¢ each. The company allows him to keep 40% of the money he takes in as pay for selling.

$\begin{array}{r} \text{\$.15} \\ \text{.40} \\ \hline \text{\$.0600 or 6¢} \end{array}$

How much is Robert's commission on the sale of one magazine?

2. One week, Robert's total sales amounted to \$28.50. What was his total commission that week?

3. Melvin sells daily newspapers at 5¢ each. His commission is 30% of his sales. One afternoon he sold 72 papers. How much was his commission, correct to the nearest cent?

4. His commission last month amounted to \$6.96. What was the amount of his total sales? Check. (Hint: $\$6.96 \div .30 = ?$)

5. Melvin sold 37 Sunday papers at 15¢ each. His commission was 30% of his sales. What was the amount of the commission?

6. Melvin wants to earn enough selling Sunday papers to buy a bicycle that costs \$45. How many Sunday papers will he need to sell to do this?

7. Mabel is past 16 years old, and works on Saturdays as salesgirl. She is paid \$3 a day plus a commission of 5% on her sales. One Saturday her sales amounted to \$35.20. How much did she earn that day?

8. Helen's father sells automobiles. He is paid \$150 a month plus a commission of 6% on all sales in excess of \$1000 a month. One month his sales amounted to \$5450. How much did he earn that month?

9. In order to meet expenses, Helen's father must earn at least \$400 a month. His sales, then, must average at least how much a month?

10. One month Harvey's commission was \$324. If his commission was at the rate of 25%, what was the amount of his sales?

11. Mr. Parker sells homes and charges 5% of the sale price as his commission. What is his commission for selling a home for \$12,000?

12. Mr. Parker paid one of his salesmen \$247.50 for finding a buyer for a home priced at \$12,375. What rate of commission did Mr. Parker pay the salesman? Check.

Find the answers quickly. Check.

- | | |
|-------------------------|--------------------|
| 13. 4% of \$250 = ? | 116% of \$750 = ? |
| 14. ?% of \$200 = \$100 | ?% of \$200 = \$50 |
| 15. 150% of ? = \$12 | 10% of ? = \$10 |
| 16. 8% of \$200 = ? | ?% of \$160 = \$16 |
| 17. ?% of \$400 = \$800 | 22% of ? = \$33 |
| 18. 18% of ? = \$72 | 36% of \$250 = ? |



Renting Boats and Money

1. Sam rents boats for 30¢ an hour. He rents a boat on an average of 6 hours a day, for 100 days a year. How much rent per year does he get from a boat?

2. It costs Sam an average of \$60 a year to keep a boat repaired and \$80 for other care. How much profit does Sam get on each boat?

3. The boats cost \$400 each. Sam said that each boat paid him 10% a year on the money he had spent for a boat. Show that he was right.

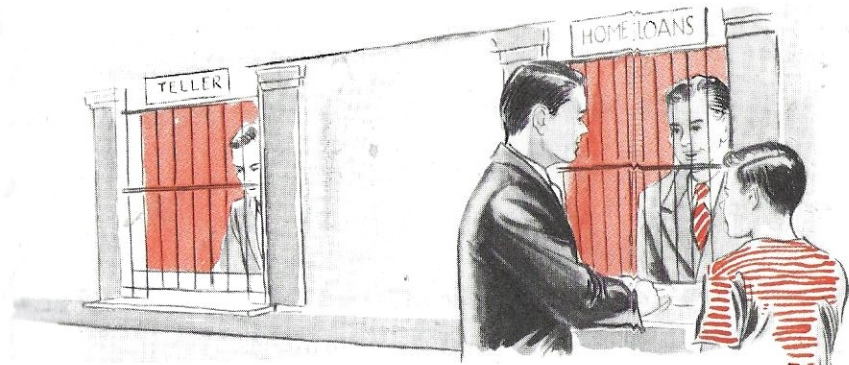
4. Sam did not have enough money to buy all the boats he needed. Mr. Hill agreed to rent money to Sam just as Sam rents his boats to others. Sam would have to pay 6% a year on the money he rented. Sam said he had to pay \$96 a year for each \$1600 he rented. Prove this.

5. Do you think it is fair that Sam charges rent for the use of his boats? Is it fair to charge rent for the use of money as Mr. Hill did?

Rent paid for use of money is called **interest**.

The amount of money rented, or borrowed, is called the **principal**.

The per cent charged as rent is the **rate**.



Renting Money from a Bank

Mr. Barker needed \$2000 to finish paying for his home. He decided to ask the bank to lend this amount to him. John went with his father to see the banker. John heard the banker say that he had \$2000 to lend at 6% per annum.

John knew that **per annum** meant per year, and that a borrower must pay the banker 6% of the amount borrowed for the use of the money for a year. Money paid for the use of other money is called **interest**. The money borrowed is called the **principal**. The interest for a year may be found by use of the formula:

$$\text{Interest} = \text{Principal} \times \text{rate, or } i = p \times r$$

1. How much did Mr. Barker need to borrow? What is this money called in the formula?

2. What rate of interest would Mr. Barker need to pay?

3. What is the interest on \$2000 for 1 year at 6%?

4. What is the interest on \$3000 for 1 year at 5%?

Finding Interest on Borrowed Money

1. Mr. Steel borrowed \$500 at 6% interest for 4 years. How many dollars in interest will he have to pay?

$$\begin{array}{r} \$500 \\ .06 \\ \hline \end{array}$$

When money is borrowed for more or less than one year, the formula is:

$$\begin{array}{r} \$30.00 \\ \times 4 \\ \hline \end{array}$$

Interest = Principal $\times$ rate $\times$ time, or

$$\begin{array}{r} \$120.00 \end{array}$$

$$i = p \times r \times t$$

2. Mr. Campbell borrowed \$400 at 5% for $2\frac{1}{2}$ yr. How many dollars in interest will he have to pay?

$$i = \$400 \times .05 \times 2\frac{1}{2} = \$50$$

The interest on \$400 at 5% for 1 year is \$20. The interest for $2\frac{1}{2}$ years is $2\frac{1}{2} \times \$20$, or \$50.

Use the formula and find the interest.

3. \$400, 4%, 2 yr.

14. \$200, $5\frac{1}{2}\%$, 4 yr.

4. \$100, 7%, 3 yr.

15. \$700, 3%, $2\frac{1}{2}$ yr.

5. \$580, 6%, 1 yr.

16. \$600, $4\frac{1}{2}\%$, 4 yr.

6. \$150, 5%, 1 yr.

17. \$1250, 6%, $1\frac{1}{2}$ yr.

7. \$4500, 4%, 5 yr.

18. \$8500, 6%, $4\frac{1}{2}$ yr.

8. \$80, 8%, $\frac{1}{2}$ yr.

19. \$480, 6%, $2\frac{1}{2}$ yr.

9. \$2450, 3%, 10 yr.

20. \$3000, $2\frac{1}{2}\%$, 6 yr.

10. \$200, $4\frac{1}{2}\%$, 6 yr.

21. \$400, $3\frac{1}{2}\%$, 6 yr.

11. \$45, 8%, 1 yr.

22. \$110, 4%, $1\frac{3}{4}$ yr.

12. \$75, 10%, $\frac{1}{2}$ yr.

23. \$600, 4%, $2\frac{3}{4}$ yr.

13. \$120, 5%, 5 yr.

24. \$150, 8%, 12 yr.

Borrowing for Parts of a Year

1. Ted borrowed \$125 at 6% for 4 mo. How many dollars was the interest?

The interest rate is for a year. Change the time to a fractional part of a year.

$$i = \$125 \times .06 \times \frac{1}{3} = \$2.50$$

Table of Time Measures

30 days (da.) = 1 business month (mo.)

360 days (da.) = 1 business year (yr.)

12 months (mo.) = 1 year

Write each as a fraction of a business year:

2. 5 mo. 6 mo. 10 mo. 9 mo. 3 mo.

3. 1 mo. 2 mo. 8 mo. 18 mo. 21 mo.

4. 15 da. 24 da. 60 da. 45 da. 90 da.

5. Bob borrowed \$240 at 5% for 15 days.

Put these values in the interest formula.

$$i = \$240 \times \frac{5}{100} \times \frac{15}{360} = \$\frac{1}{2} = \$0.50$$

Use cancellation and find the interest:

6. \$300, 4%, 3 mo. 10. \$150, 3%, 10 mo.

7. \$500, 5%, 6 mo. 11. \$125, 8%, 3 mo.

8. \$1200, 4%, 9 mo. 12. \$900, 7%, 8 mo.

9. \$750, 6%, 8 mo. 13. \$540, 6%, 5 mo.

Solving Interest Problems

1. Mr. Bond borrowed \$400 at $4\frac{1}{2}\%$ for 6 mo. How much was the interest?

$$4\frac{1}{2}\% = \frac{9}{2}\% = \frac{9}{200} \quad i = \frac{\cancel{400}^2}{1} \times \frac{9}{200} \times \frac{1}{2} = \$9$$

2. Write each of these interest rates as a fraction.

$$3\frac{1}{2}\% \quad 5\frac{1}{2}\% \quad 7\frac{1}{2}\% \quad 2\frac{1}{4}\% \quad 1\frac{1}{2}\% \quad 3\frac{3}{4}\% \quad 1\frac{7}{8}\%$$

Use cancellation and find the interest:

3. \$120, $3\frac{1}{2}\%$, 30 da. \$4000, $2\frac{1}{2}\%$, 90 da.
 4. \$720, $2\frac{1}{4}\%$, 45 da. \$6400, $1\frac{7}{8}\%$, 15 da.
 5. Miss Jones had \$1200 to invest. A savings bank would pay her 2% interest. How much interest would she get in 5 years?

6. Instead of depositing her money in the savings bank, she used it to buy a cottage. She rented the cottage at \$30 per month. It cost her \$240 a year to pay for taxes and repairs. How much was her profit per year from the cottage?

7. Miss Jones said the profit on her cottage was equivalent to 10% interest on her investment. Check and show this is correct.

8. Mr. Dodson borrowed \$2000 to buy a grocery store. At 6%, how many dollars interest did he have to pay each year?

9. Mr. Dodson made a profit of \$2,897.75 the first year. After paying what he had borrowed and the interest, how much did he have left?

Using Days as Fractions of a Year

1. Mr. Hall borrowed \$300 at 4% for 27 days. How much was the interest?

$$i = \cancel{300}^3 \times \frac{4}{100} \times \frac{\cancel{27}^3}{\cancel{360}^{90}} = \$\frac{9}{10} = \$.90$$

Use cancellation and find the interest:

2. \$500, 3%, 60 da. \$500, 4%, 18 da.
 3. \$600, 6%, 30 da. \$250, 3%, 60 da.
 4. Mr. Smith borrowed \$240.60 at $3\frac{1}{2}\%$ for 60 days. Find the interest correct to the nearest whole cent.

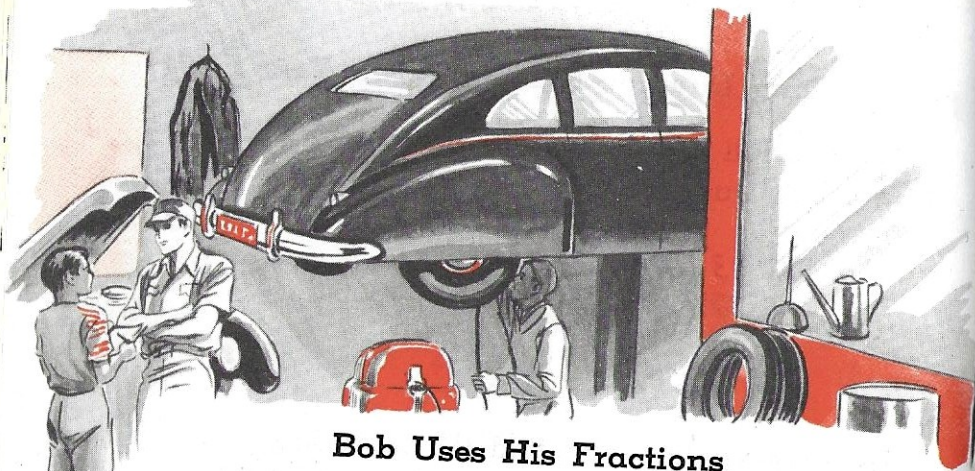
$$\cancel{240.60}^{20.05} \times \frac{7}{200} \times \frac{\cancel{60}^{30}}{\cancel{360}^{12}} = \frac{140.35}{100} = \$1.4035 \text{ or } \$1.40$$

Find the interest correct to the nearest whole cent.

5. \$450, 2%, 36 da. \$975, $3\frac{1}{2}\%$, 18 da.
 6. If \$10 interest is paid for the use of \$500 for 1 year, what is the rate of interest?

$$\frac{\$10}{\$500} = \frac{\$.02}{\$500 \div \$10.00} = 2\%$$

7. What is the rate of interest if \$1.8 is paid for the use of \$400 for 1 year?



Bob Uses His Fractions

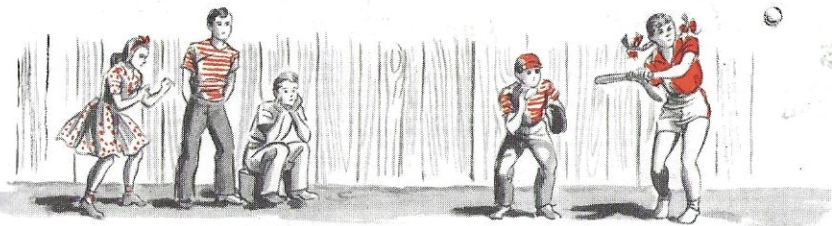
Bob is bookkeeper in his father's garage.

1. Mr. Mason is a mechanic. Last week he worked $8\frac{3}{4}$ hr. on Monday, $7\frac{1}{2}$ hr. on Tuesday, 9 hr. on Wednesday, $6\frac{1}{4}$ hr. on Thursday, and $8\frac{1}{2}$ hr. on Friday. At \$1.85 an hour, how much did he earn each day? How much did he earn for the whole week?

2. Sam Hall is a helper. Last week he worked 4 hr. 10 min. on Monday, 8 hr. 45 min. on Tuesday, 8 hr. 40 min. on Wednesday, 9 hr. 30 min. on Thursday, and 6 hr. 20 min. on Friday. At \$1.32 an hour, how much did he earn each day? How much did he earn for the whole week?

3. How many pieces of each denomination of money (cents, nickels, dimes, and so on) will Bob get from the bank to pay Mr. Mason for the week?

4. How many pieces of each denomination of money will Bob get to pay Sam Hall for his week's work?



Your Turn at Bat

Mark papers after each game.

Make 6 hits in the **First Game**.

Find interest by the method explained on page 104.

1. \$860, 4%, 4 yr. \$2400, 3%, $3\frac{1}{2}$ yr.
2. \$1900, $5\frac{1}{2}$ %, 2 yr. \$150.75, 2%, $2\frac{1}{2}$ yr.
3. \$400, 7%, 6 yr. 3 mo. \$420.60, 3%, 3 yr. 6 mo

Make 6 hits in the **Second Game**.

Find interest by cancellation.

4. \$150, 4%, 50 da. \$240.30, $2\frac{1}{2}$ %, 30 da.
5. \$3000, $3\frac{1}{2}$ %, 90 da. \$127.50, 5%, 120 da.
6. \$2450, 2%, 18 da. \$9800, $3\frac{1}{2}$ %, 48 da.

Make 6 hits in the **Third Game**.

Find interest by cancellation.

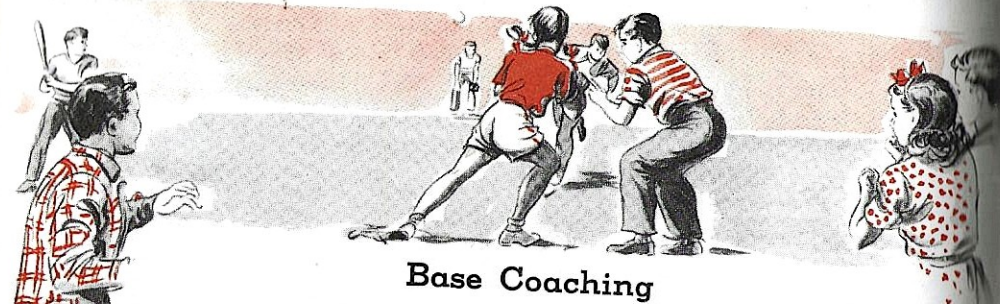
7. \$200, 4%, 50 da. \$24.60, $2\frac{1}{2}$ %, 30 da.
8. \$225, $4\frac{1}{2}$ %, 90 da. \$9.60, 6%, 27 da.
9. \$45,500, $5\frac{1}{2}$ %, 18 da. \$180, 5%, 54 da.

Make 6 hits in the **Fourth Game**.

Choose your own method to find interest.

10. \$350, 4%, 2 yr. \$120, 6%, $2\frac{1}{2}$ yr.
11. \$900, $1\frac{1}{2}$ %, 8 mo. \$7200, $4\frac{1}{2}$ %, 240 da.
12. \$6000, $2\frac{1}{2}$ %, 72 da. \$500, $1\frac{1}{2}$ %, 48 da.

If your batting average was .917 or more, work on page 111. Others will work on page 110.



Base Coaching

To find interest, you must know the amount of money that is borrowed (principal), the rate of interest, and the time. The time is the number of years, months, or days the money is borrowed. In working interest problems, we must have the time in years or fractional parts of a year.

To change months to a part of a year, write the number of months as numerator and 12 as denominator. The denominator is 12 because there are 12 months in a year.

$$4 \text{ mo.} = \frac{4}{12} \text{ yr.} = \frac{1}{3} \text{ yr.}$$

To change days to a part of a year, write the number of days as numerator and 360 as denominator. Why do we use 360 as denominator?

$$72 \text{ da.} = \frac{72}{360} \text{ yr.} = \frac{1}{5} \text{ yr.}$$

The interest formula is: Interest = Principal $\times$ rate $\times$ time, or $i = p \times r \times t$.

You may shorten your work with cancellation.

Find the interest:

- | | |
|----------------------|----------------------------------|
| 1. \$45, 6%, 4 yr. | \$560, 6%, 2 $\frac{1}{2}$ yr. |
| 2. \$200, 3%, 5 yr. | \$750, 3 $\frac{1}{2}$ %, 4 yr. |
| 3. \$255, 2%, 2 yr. | \$800, 3%, 2 $\frac{1}{2}$ yr. |
| 4. \$850, 4%, 4 mo. | \$1000, 3 $\frac{1}{2}$ %, 2 mo. |
| 5. \$250, 3%, 10 mo. | \$4800, 3%, 90 da. |



Stealing Bases

1. Find the interest on \$600 for 2 yr. 6 mo. 24 da. at 4%. Work this example in three steps:

Step One: Find the interest for 2 yr. 6 mo.

Think: 2 yr. 6 mo. = 2 $\frac{1}{2}$ yr. = $\frac{5}{2}$ yr.

$$\cancel{6} \$600 \times \frac{\cancel{4}}{100} \times \frac{5}{2} = \$60 \text{ interest for 2 yr. 6 mo.}$$

Step Two: Find the interest for 24 da.

$$\cancel{6} \$600 \times \frac{\cancel{4}}{100} \times \frac{24}{\cancel{360}} = \frac{\$16}{10} = \$1.60 \text{ interest for 24 da.}$$

Step Three: Find interest for 2 yr. 6 mo. 24 da.

\$60 interest for 2 yr. 6 mo.

\$1.60 interest for 24 da.

\$61.60 interest for 2 yr. 6 mo. 24 da.

Find the interest using the steps shown above.

Principal	Interest	Time
2. \$2400	3%	3 yr. 2 mo. 25 da.
3. \$3500	2%	2 yr. 10 mo. 15 da.
4. \$9500	4 $\frac{1}{2}$ %	3 yr. 6 mo. 24 da.
5. \$7200	4%	1 yr. 9 mo. 20 da.
6. \$8550	2 $\frac{1}{2}$ %	2 yr. 4 mo. 21 da.

Explain this work to a pupil working page 110.

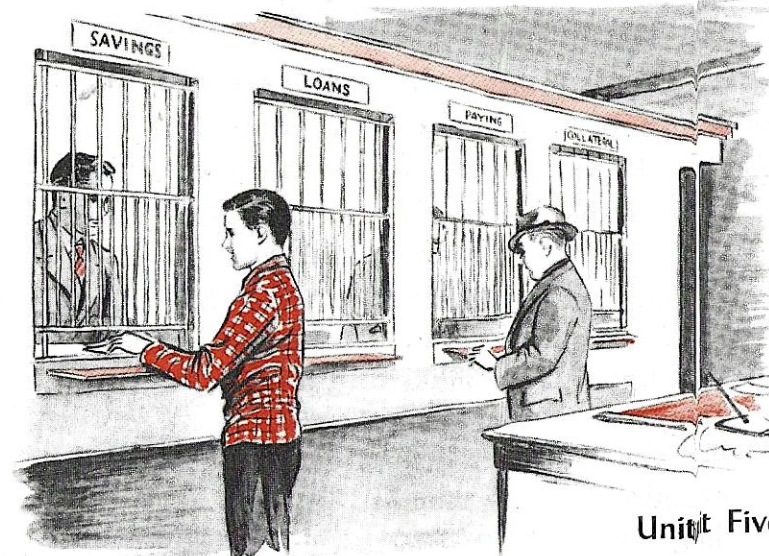


Crossing Home Plate

1. What is the interest on \$100 borrowed for 9 months at $5\frac{1}{2}\%$?
2. When Mr. Barnes had an unexpected doctor's bill to pay he borrowed \$80 for sixty days at 6%. How much would the interest be?
3. What fractional part of a year is 8 months? 90 days? 10 months? 120 days? 15 months?
4. Give the formula for finding interest when you know the principal, the rate of interest and the time for which the money is borrowed.
5. Find the interest on \$200 for 2 yr. at 4%.
6. A loan company charged Mr. Brown \$15 to borrow a sum of money for a year at 6% interest. How much money did Mr. Brown borrow?
Think: The part is \$15. The per cent is 6%. The whole is the principal.

Part ÷ per cent = whole

7. William borrowed \$475 for one year so he could begin college. If he paid 5% interest, how much will he have to pay back at the end of the year to pay back the principal and the interest?
8. Find the interest on \$420 at $2\frac{1}{2}\%$ for 2 yr. 3 mo.
9. Find the interest on \$2500 at 5% for 24 da.



Unit Five

Using the Services of a Bank

1. Jack opened a savings account with a deposit of \$30. He had sold his bicycle for \$20, his father had given him \$5 for his birthday, he earned \$3.50 cutting grass, and he took the remainder from his dime bank. How much did he take from his dime bank?
2. Bring a savings deposit slip to school, or draw one. Fill in the deposit slip showing how Jack opened his account.
3. Jack's father has a savings account and a checking account at the bank. How are these alike and how are they different?
4. What expenses does a bank have in handling a checking or a savings account?

Finding Time Between Dates

1. Jack's father borrowed \$1500 from the bank on July 16, and paid it on Nov. 2 of the same year. How long did he use the money?

July is the seventh month and November is the eleventh month.

Under Day, you cannot take 16 from 2. You "borrow" 1 month (30 days) from 11 months, and add the 30 days to 2 days to make 32 days. Then you take 16 days from 32 days and take 7 months from 10 months.

The answer is 3 months and 16 days.

2. How many years, months, and days is it from Aug. 25, 1943 to June 28, 1945?

1945	6	28	→ {	1944	18	28
1943	8	25		1943	8	25
				1	10	3

The answer is 1 yr., 10 mo., 3 da.

Find the time between these dates.

3. May 30 to Dec. 25 of the same year.
4. Oct. 18, 1947 to June 25, 1950.
5. Oct. 15, 1894 to July 7, 1898.
6. Mar. 12, 1945 to Mar. 8, 1946.
7. Nov. 20, 1904 to Jan. 2, 1947.
8. Find the interest on \$600 from Nov. 12, 1947 to June 30, 1948 at 6%.

Problems a Banker Must Solve

When a bank lends money, it collects the interest in advance. This means the bank discounts the note when the loan is made. If Mr. Smith borrowed \$500 at 6% for 1 year from a bank, the bank would give Mr. Smith only \$470. The bank would keep the remaining \$30 as interest paid in advance. When the money became due, Mr. Smith would pay the bank \$500.

1. Mr. Wilson borrowed \$1800 from the bank. The interest amounted to \$54. How much money did the bank actually give to Mr. Wilson?

2. A builder borrowed \$4000 from a bank for 90 days at 4%. What was the interest? How much did the builder actually receive?

The interest a bank collects in advance is called the **bank discount**. The amount of the loan less the bank discount is called the **proceeds**.

Find the bank discount and the proceeds of each of these loans.

3. \$300 at 6% for 120 days.
4. \$1200 at 4% for 8 months.
5. \$720 at 5% for 3 mo. 18 da.
6. \$9000 at 3% for 6 mo. 20 da.
7. \$840 at $4\frac{1}{2}\%$ for 9 mo.
8. \$600 at $2\frac{1}{2}\%$ from Mar. 2 to Nov. 20.
9. \$960 at $3\frac{1}{2}\%$ from Apr. 21 to Oct. 15.
10. \$1800 at 5% from July 7 to Dec. 3.
11. \$339.50 at 4% for 75 days.

Watching a Savings Account Grow

1. Betty has \$150 in a savings account. She takes no money from it and adds none to it. The bank pays her 3% interest for each whole dollar in the account, and adds this interest to her money every six months. How much will Betty have in her account at the end of 2 years?

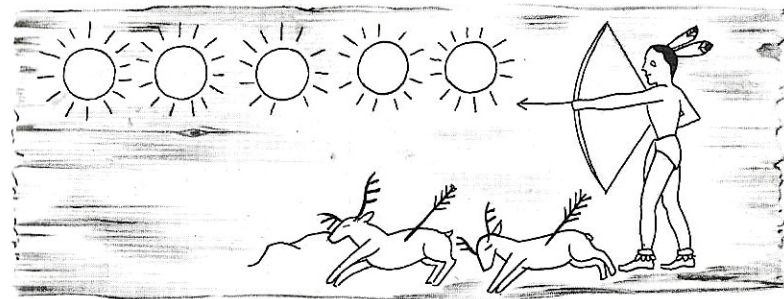
\$150.00	Principal
2.25	Interest on \$150 at 3% for 6 mo.
\$152.25	Amount at the end of 6 mo.
2.28	Interest on \$152 at 3% for 6 mo.
\$154.53	Amount at the end of 12 mo.
2.31	Interest on \$154 at 3% for 6 mo.
\$156.84	Amount at the end of 18 mo.
2.34	Interest on \$156 at 3% for 6 mo.
\$159.18	Amount at the end of 2 yr.

Betty's savings account grew from \$150 to \$159.18 in 2 years, at 3% interest.

2. If Betty had had \$200 instead of \$150 in her savings account, how much would she have had at the end of two years?

3. Mary has \$180 in a savings account. The bank pays 4% interest and adds interest to the principal every 6 mo. How much will Mary have in her account at the end of 2 yr.?

4. If the interest rate had been 3%, how much would Mary have had at the end of 2 yr.?

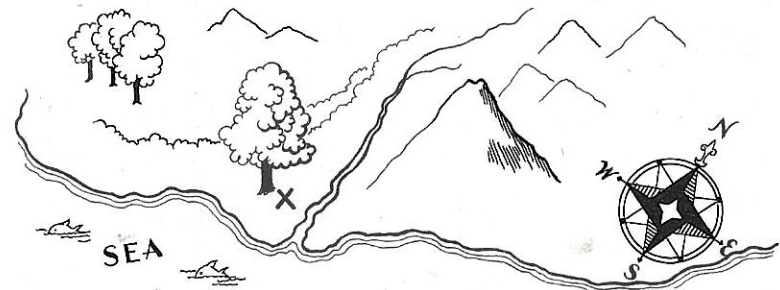


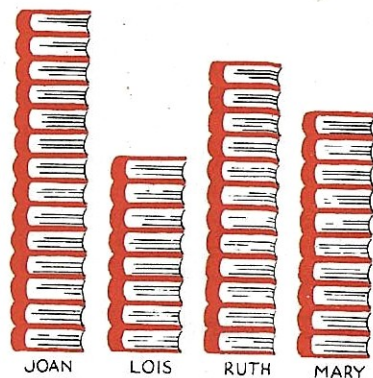
Graphs and Scale Drawing

The Indian made a graph when he scratched on bark the outline of a warrior with two deer at his feet and five suns overhead. The artist was telling us the warrior had killed two deer in five days.

The pirate made a scale drawing when he sketched the seashore, the mountain peak, the creek, and the tree, and marked with an X where the gold was buried.

Books, magazines, and newspapers of today use graphs and scale drawings to convey ideas of many sorts. To keep up with the times, we must know about graphs and scale drawings.

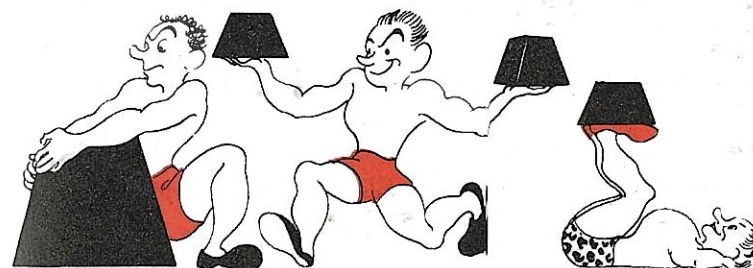
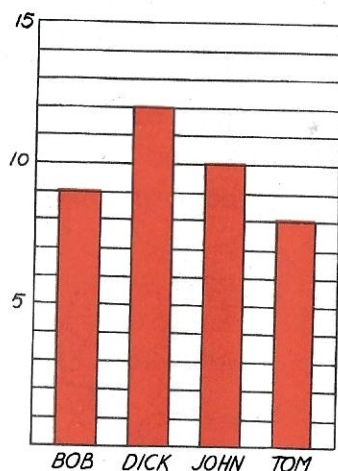
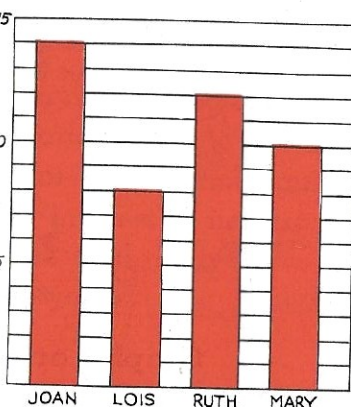




Pictures of Vacation Fun

Some seventh grade girls were telling how many books they had read during vacation. Each of four girls placed in a pile as many books as she had read. Look at the picture at the left above and tell how many books each girl had read. These same facts are also shown in the bar graph. Read from the bar graph the number of books each girl had read.

1. Read the bar graph at the right. Each space on the vertical line means one time in the swimming pool. Tell how many times each boy went swimming in June.



Developing Power in Problem Solving

1. The table at the right tells the number of times the boys went swimming in July. Show this in a bar graph. In making this bar graph—

Boy	Times Swimming
Bob	14
Dick	12
John	8
Tom	10

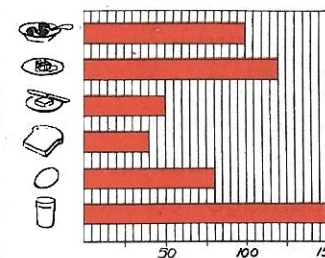
a. Decide how wide to make each bar and how far apart to make the bars. All bars should be the same width, and distances between bars should be the same.

b. Decide how long to make a space that is to stand for one time in swimming.

c. Be neat and careful in drawing lines.

d. Use graph paper if possible.

2. Jane had for breakfast, 1 glass of milk, 1 slice of bread, 3 large prunes, 1 egg, 1 pat of butter, 1 serving of honey. The number of calories in each portion is shown in the graph.

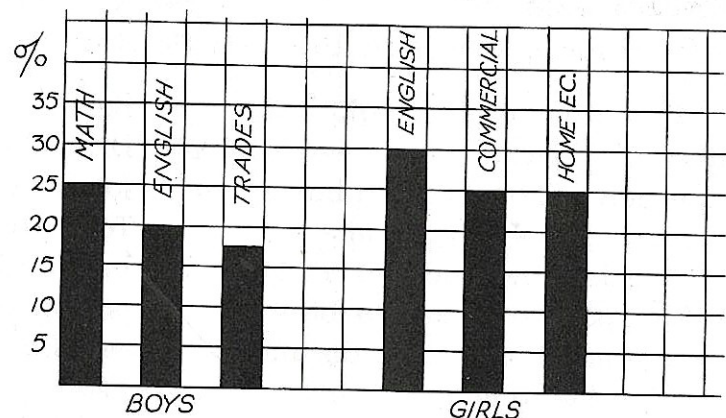


Jane's Breakfast

How many calories were in each portion that Jane had for breakfast? How many calories did Jane have altogether?

What School Subject Is Most Valuable

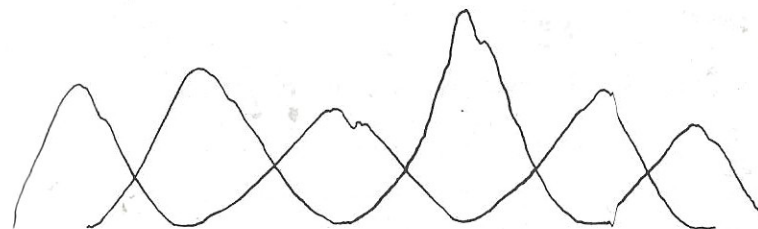
Many boys and girls were asked what they considered the most valuable school subject. The answers are shown in the graphs below.



1. What percentage of the boys considered mathematics the most valuable school subject? What percentage considered English as most valuable? What percentage considered trades as most valuable?

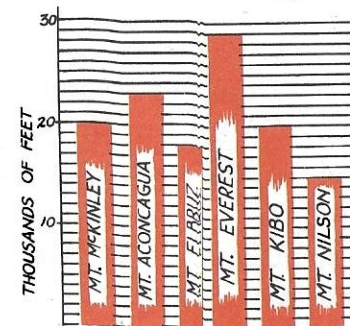
2. What percentage of the girls considered English as most valuable? What percentage considered commercial as most valuable? What percentage considered home economics as most valuable?

3. Ask 10 boys and 10 girls in your school what they consider the most valuable school subject. Make a bar graph of the boys' answers and another bar graph of the girls' answers.



Rounding Off Large Numbers for Graphs

1. The actual heights of the six highest mountain peaks are shown below. In a graph, it is better to round off the actual heights to the nearest thousand feet.



The Six Highest Mountains

Compare the heights given in the table below with those shown in the graph.

	Actual	Rounded
Mount McKinley	20,300	20,000
Mount Aconcagua	22,834	23,000
Mount Elbruz	18,468	18,000
Mount Everest	29,141	29,000
Mount Kibo	19,710	20,000
Mount Nilson	15,400	15,000

2. These are the lengths of six great rivers. Round off each length to the nearest hundred miles. Show the facts in a horizontal bar graph.

Mississippi -		
Missouri	3988 miles	Rio Grande 1800 miles
Amazon	3946 miles	Colorado 1360 miles
Amur	2973 miles	Columbia 1214 miles

Up and Down with the Thermometer

Average monthly temperatures in a large city are shown in the line graph below.

These are the steps in making a line graph.

a. Draw a horizontal line, O - X, near the bottom of the space to be used.

b. Draw a vertical line, O - Y, near the left of the space to be used.

c. Write the names of the items measured (months) at equal intervals along O - X.

d. Mark the units of measure along O - Y.

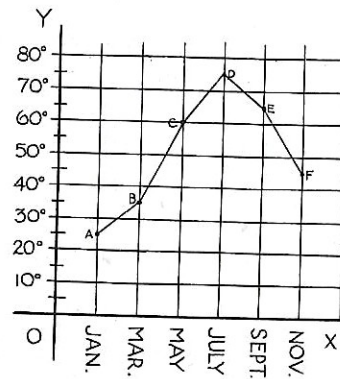
e. Mark a point as A, B, C, . . . above the name of each item measured showing its measure.

f. Join each point A, B, C, . . . to the next by a line segment.

1. Make a table giving the temperatures above.

2. Show these temperatures in a line graph:
February 35° June 70° October 55°
April 45° August 75° December 40°

3. The temperatures in the graph above and in Problem 2 are from the same large city. Show them all in one graph, with the twelve months in proper order.



Travel by Air in U.S.A.

1. What was the average length in miles of air trips in each year shown in the graph at the top?

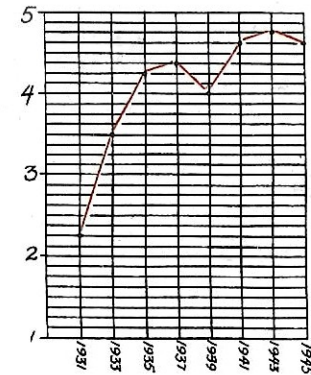
2. At 4.5¢ per mile, what was the fare for an average trip in 1945?

3. How many air passengers were there in 1931? In 1945?

4. How much did it cost to travel a mile by air in 1926? In 1944?

5. It is about 800 miles from Baltimore to St. Louis. About how much would the air fare have been in 1928? In 1940?

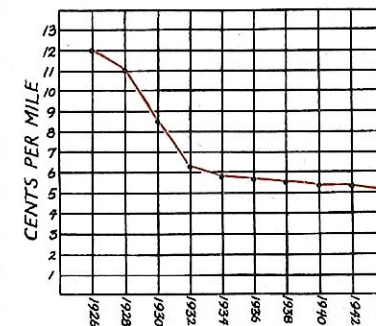
6. One air transport company collected fares for about 52,000,000 passenger miles in one year. At 4.9¢ per passenger mile, what was the total fare collected?



Average Number of Miles per Air Trip (00 omitted)



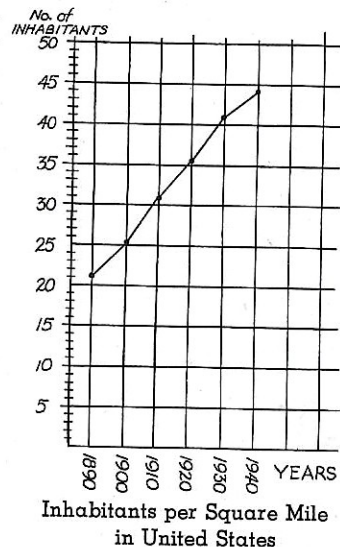
Number of Air Passengers (00,000 omitted)



Cost of Air Passenger Fare in Cents per Mile

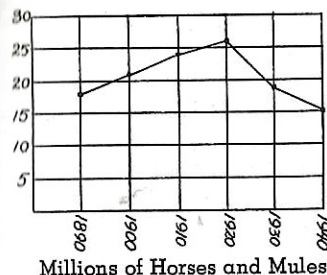
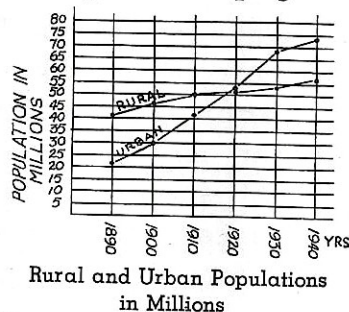
Our Population Grows with the Years

1. Write in table form the number of persons per square mile as shown in the graph at the right.
2. The land area of the United States proper is 2,977,128 sq. mi. Find the population of the United States for each of the years shown in the graph. (Multiply the number of square miles of land area by the population per square mile to the nearest whole number. This will give you some good practice in multiplication.)



3. Round off the answers found in Problem 2 above to the nearest million, and show them in a line graph. How does this graph compare in shape with the graph at the top of this page?

4. Show the facts of the graph at the right in table form. What is meant by rural? Urban? About what year did the rural population equal the urban population?



Livestock Populations

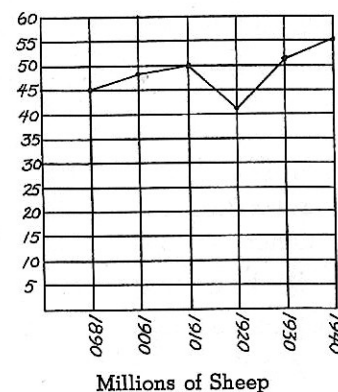
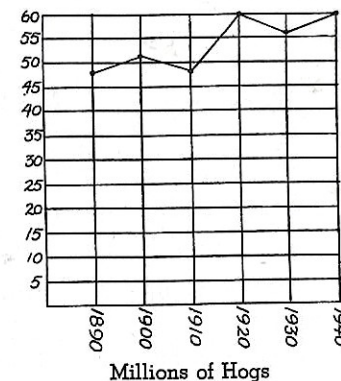
1. Compare the horse and mule populations as given in the graph at left above with the human populations given on page 124. Would you expect the number of horses and mules to increase as the number of persons increase?

2. How do you account for the decline in the number of horses and mules since 1920?

3. Compare the graphs of the number of hogs and sheep with the human populations given on page 124. Would you expect the number of meat animals to increase as the population increases?

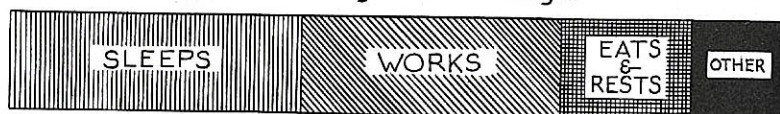
4. Use the graph on page 124 to show that since 1890 the human population has more than doubled.

5. Did the number of hogs double between 1890 and 1940? Did the number of sheep?



Reading and Making Rectangular Graphs

1. From the graph below, tell how many hours a day Edith sleeps, how many hours she works, how many hours she eats or rests, and how many hours she spends doing other things.



How Edith Uses a 24-Hour Day

2. Fred's work hours are irregular. Make a graph showing how he spends each 24-hour day for a week. Use the table below.

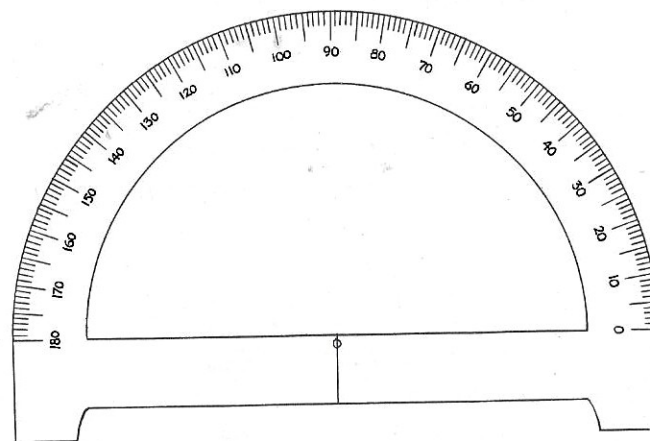
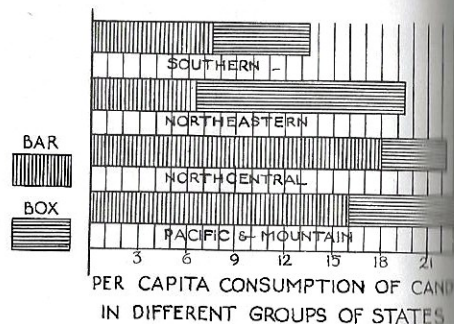
	Mon.	Tu.	Wed.	Th.	Fri.	Sat.
Sleep	8 hr.	7 hr.	10 hr.	4 hr.	12 hr.	6 hr.
Work	8	10	8	12	6	4
Eat & Rest	5	5	4	4	5	4
Other	3	2	2	4	1	10

3. Use the graph at the bottom of the page to answer these questions:

What is the total per capita consumption of candy in each group of states? Exactly what does this mean?

What is the per capita consumption of bar candy alone in each group of states?

What is the per capita consumption of box candy alone in each group of states?



Learning Angle Measure

You must learn about angle measure in order to understand a new kind of graph: the circle graph.

Lines may be measured in inches with a ruler.

Angles may be measured in degrees with a **protractor**. The sign for degrees is $^{\circ}$. Ten degrees may be written as 10° .

There are 90° in a right angle, and there are 360° all the way around a point.

1. How many right angles will fit at the center of a circle?

2. If a circle is divided into six equal parts by diameters, how many degrees are in each of the angles at the center of the circle?

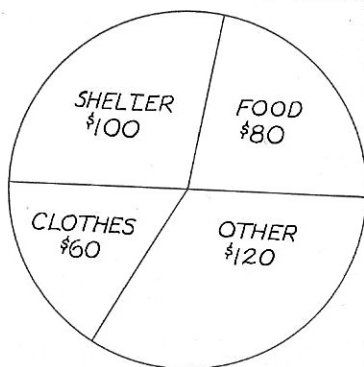
3. If three radii divide a circle into three equal parts, how many degrees are in each angle?

Making Easy Circle Graphs

The Jones family spend an average of \$80 a month for food, \$100 a month for shelter, \$60 a month for clothes, and \$120 a month for other things. Show these expenditures in a circle graph.

The sum of the monthly expenditures is \$360. It will take 1° at center of circle to represent \$1.

80° to represent \$80
 100° to represent \$100
 60° to represent \$60
 120° to represent \$120



The example was easy because the number of dollars spent (\$360) is exactly equal to the number of degrees (360°) in a complete revolution.

If \$180 were spent, it would take 2° at center to represent \$1. Explain.

If \$720 were spent, it would take $\frac{1}{2}^\circ$ at center to represent \$1. Explain.

1. If \$90 were spent, how many degrees would it take at center to represent \$1? Draw circle graphs to show these expenditures:

- | | | |
|--------------|---------------|--------------|
| 2. Food \$60 | 3. Food \$150 | 4. Food \$30 |
| Shelter 45 | Shelter 250 | Shelter 25 |
| Clothes 35 | Clothes 200 | Clothes 20 |
| Other 40 | Other 120 | Other 15 |

Making Harder Circle Graphs

1. The Brown family used 30% of its income for food, 25% for shelter, 20% for clothes, and 25% for other things. Show these facts in a circle graph.

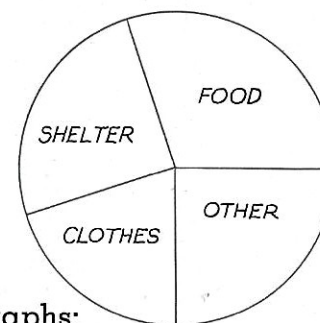
Change the given percentages to degrees.

$$30\% \times 360^\circ = 108^\circ$$

$$25\% \times 360^\circ = 90^\circ$$

$$20\% \times 360^\circ = 72^\circ$$

$$25\% \times 360^\circ = 90^\circ$$



2. Make these circle graphs:

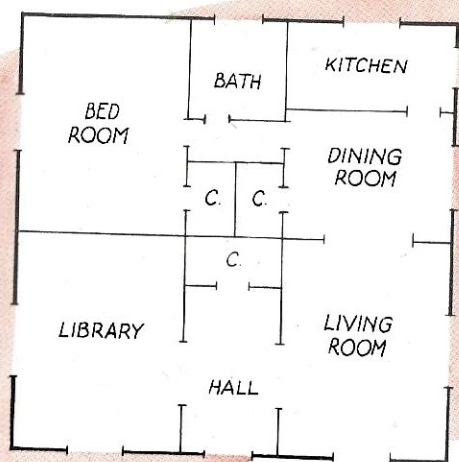
	Food	Shelter	Clothes	Other
Smith	$33\frac{1}{3}\%$	25%	20%	$21\frac{2}{3}\%$
Jones	50%	30%	10%	10%
White	40%	$37\frac{1}{2}\%$	20%	$2\frac{1}{2}\%$
Black	$37\frac{1}{2}\%$	25%	$6\frac{1}{4}\%$	$31\frac{1}{4}\%$
Adair	30%	40%	$16\frac{2}{3}\%$	$13\frac{1}{3}\%$
Green	50%	$33\frac{1}{3}\%$	15%	$1\frac{2}{3}\%$

3. The Smiths' income is \$360 a month. How many dollars do they have for each of the four items in their budget?

4. The Joneses have an income of \$200 a month. How much do they use for food?

5. The income of the Whites is \$280 a month. How much can they use for shelter?

6. The Adairs' income is \$600 a month. How much can they allow for clothes?



Floor Plan of a Cottage

The actual dimensions of the cottage are 36 feet by 36 feet. The scale drawing of the floor plan is $2\frac{1}{4}$ inches by $2\frac{1}{4}$ inches. This means that 1 inch on the scale drawing stands for 16 feet, or $1''=16'$.

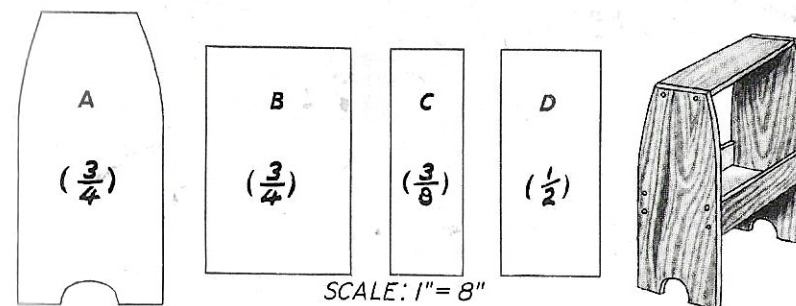
1. The living room is 14 feet by 18 feet. What should be the dimensions on the scale drawing?

2. On the scale drawing, the dimensions of the bathroom are $\frac{1}{2}$ inch by $\frac{1}{2}$ inch. What are the actual dimensions?

Measure the dimensions on the scale drawing and then find the actual dimensions of the rooms:

- | | | |
|------------|----------------|-------------------|
| 3. Library | 6. Hall | 9. Bedroom Closet |
| 4. Bedroom | 7. Bathroom | 10. Hall Closet |
| 5. Kitchen | 8. Dining Room | 11. Dining Closet |

12. Draw the cottage above to the scale: $1''=8'$.



Plans for a Shoeshine Stand

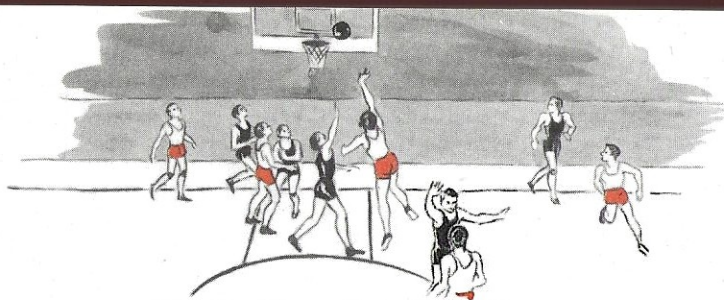
Robert wants to make a shoeshine stand to give to his father for a birthday gift. The shop teacher gave Robert plans drawn to the scale: $1''=8''$.

There are two pieces, A, for the ends of the stand; one piece, B, for the bottom; two pieces, C, for molding around bottom; and one piece, D, for handle and footrest. The thickness of each piece, when smoothed, is given in parenthesis within the figure.

1. Draw each of the pieces to exact size, on heavy paper or cardboard. Cut around the drawings you make. Could the cut-outs you have made be used as patterns in making wood pieces for the shoeshine stand?

2. Plan a book shelf like the one shown below so that it will fit on the teacher's desk. In making the drawing, use the scale, $1''=4''$.





Scale Drawing for Games

1. A college basketball court is a rectangle 90 ft. by 45 ft. Make a scale drawing of this, letting $1'' = 15'$.

2. A junior high school basketball court is a rectangle 74 ft. by 42 ft. Make a scale drawing, letting $1'' = 8'$.

3. Each of the following courts is a rectangle. Choose a suitable scale and make a scale drawing of each. Write the scale you chose under the drawing.

Tennis Court 78 feet long and 36 feet wide

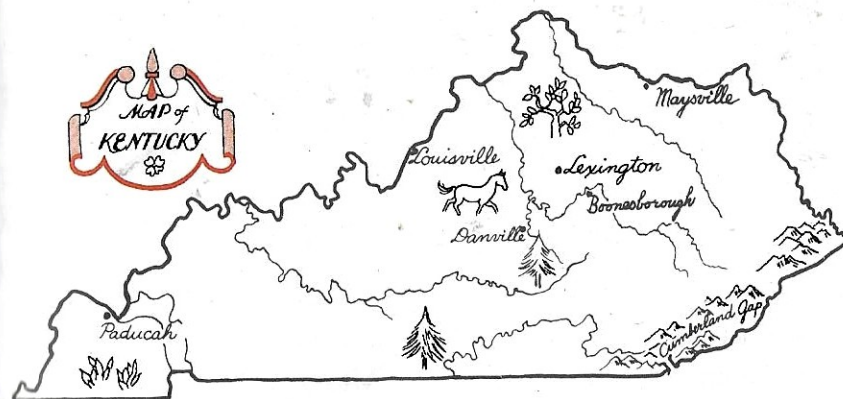
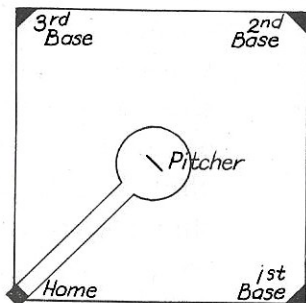
Volley Ball Court 60 feet long and 30 feet wide

Badminton Court 44 feet long and 20 feet wide

4. A baseball diamond is a square 90 feet on a side. What scale is used in the drawing of the baseball field at the right?

5. Draw a ball diamond to the scale, $1'' = 40'$.

6. A checkerboard is 18 in. square, including a border 2 in. wide all the way around. Make a scale drawing of a checkerboard, letting $1'' = 4''$.



Reading Distances on a Map

Joan read that the state of Kentucky is about 400 miles long and that its greatest width is about 180 miles.

1. What is the map length in inches of Kentucky? How many miles does this represent?

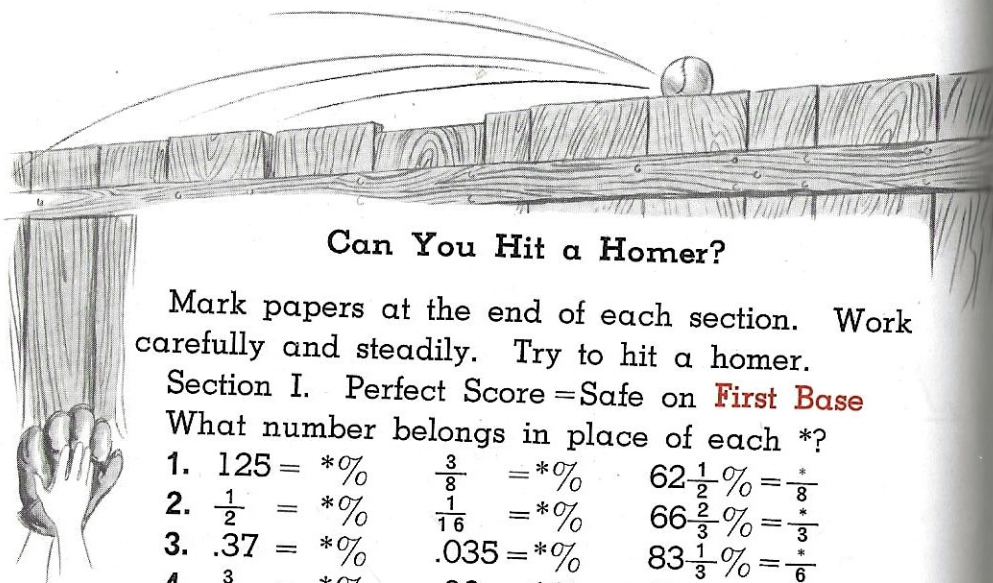
2. What is the map width in inches? How many miles does this represent?

3. What is the map distance in inches from Cumberland Gap to Boonesborough (Daniel Boone's old trail)? How many miles does this represent?

4. Mr. Adams plans to drive from Maysville to Lexington to Louisville, and on to Paducah. Assuming the road runs straight from one city to the next, about how many miles will he drive?

5. Find a map of your state. What is the scale used on the map?

6. What is the length of your state in inches on the map? About how many miles does this represent?



Can You Hit a Homer?

Mark papers at the end of each section. Work carefully and steadily. Try to hit a homer.

Section I. Perfect Score = Safe on **First Base**

What number belongs in place of each *?

- | | | |
|-----------------------|---------------------|---------------------------------|
| 1. $125 = *%$ | $\frac{3}{8} = *%$ | $62\frac{1}{2}\% = \frac{*}{8}$ |
| 2. $\frac{1}{2} = *%$ | $\frac{1}{16} = *%$ | $66\frac{2}{3}\% = \frac{*}{3}$ |
| 3. $.37 = *%$ | $.035 = *%$ | $83\frac{1}{3}\% = \frac{*}{6}$ |
| 4. $\frac{3}{4} = *%$ | $.06 = *%$ | $15\% = \frac{*}{20}$ |
| 5. $30\% = *$ | $75\% = *$ | $.1\% = *$ |

Section II. Perfect Score = Safe on **Second**

Find the answers:

- | | | |
|---------------|-------------------------|-------------------------|
| 6. 4% of 16 | 125% of 32 | .1% of 2000 |
| 7. 15% of 20 | 3% of 600 | 10% of 200 |
| 8. 75% of 640 | $6\frac{1}{4}\%$ of 640 | $8\frac{1}{3}\%$ of 480 |

Section III. Perfect Score = Safe on **Third**

Find what per cent each of the following is of 60.

- | | | | | | | | |
|-------|---|----|----|----|-----|-----|-----|
| 9. 6 | 8 | 30 | 48 | 96 | 150 | 144 | 180 |
| 10. 5 | 9 | 12 | 15 | 10 | 45 | 60 | 90 |

Section IV. Perfect Score = Safe at **Home**

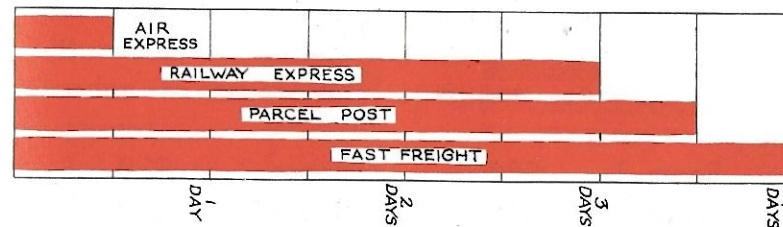
Use cancellation and find the interest.

11. \$900, 4%, 3 mo.
12. \$1500, 5%, 6 mo.
13. \$3000, $4\frac{1}{2}\%$, 27 da.
14. \$150, 6%, $2\frac{1}{2}$ yr.



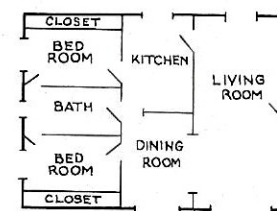
Your Turn at Bat

1. How long does it take to move goods from New York to Kansas City by air express? By railway express? By parcel post? By fast freight?



Air and Train Time from New York to Kansas City

2. The scale of the floor plan at the right is 1"=32'. What is the actual length and what is the actual width of each room?



3. Redraw the same floor plan to the scale, 1"=8'.

If you need extra help with graphs, study page 136. If you do not need extra help, study page 137.



Base Coaching

A good bar graph has a title.

Each bar of a good bar graph is named.

In a good bar graph, the bars are all the same width and there is space between bars.

The scale of length of the bars is such that the longest bar will fit the space one has.

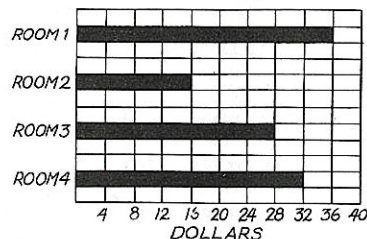
John wanted to make a graph to show the sale of savings stamps in his room at school. The sales were:

Room 1	\$36	Room 3	\$28
Room 2	\$16	Room 4	\$32

He decided to make a horizontal bar graph.

There were 10 spaces on his graph paper, and the greatest amount was \$36. This made him decide to allow one space on the paper to stand for \$4. Then the bar that was named Room 1 would need 9 spaces. Why? How many spaces would each of the other bars need?

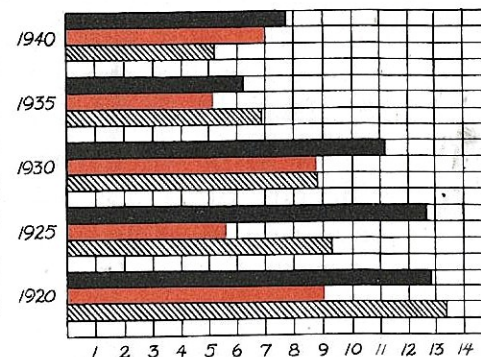
The graph that John made is shown at the right. Does this graph satisfy the requirements of a good bar graph?



Stealing Bases

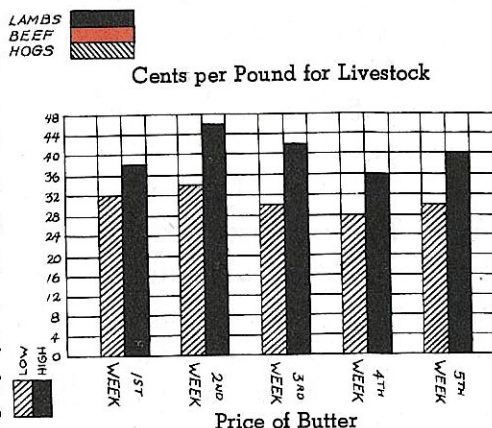
The banker and the business man use graphs.

1. Between what years did the price of lambs decline? Increase? What were the underlying reasons for these changes in price?



2. Answer the questions of Problem 1 for beef cattle and for hogs.

3. The price of butter was as low as 32¢ a pound and as high as 38¢ in the first week shown in the graph. What was the low and the high for butter for each of the other weeks?



4. If you were in the cattle business, what use would it be to you to know that the price of cattle next year would be 3 cents less on a pound than this year? What might happen if you did not know?



Crossing Home Plate

1. John read page 13 and every page through page 91. How many pages did he read?

2. Count the exact number of days from Jan. 15, 1948 to Mar. 15, 1948. Remember there are 29 days in February in a leap year.

3. Mr. Hope has 13 sticks of wood each 8 ft. long, and 4 sticks each 6 ft. long. How many cuts will he need to make to cut the wood into 2-foot lengths?

4. The scale of a map is $1'' = 120$ mi. How many miles are represented by $\frac{1}{2}''$ on the map? By $\frac{7}{8}''$? By $1\frac{1}{4}''$? By $2\frac{3}{8}''$?

5. These values are to be shown in a bar graph: \$1,875,000; \$1,500,000
\$1,125,000; \$ 750,000

The longest bar may not be longer than 2 in.

How many dollars would you allow 1 in. on the graph to represent?

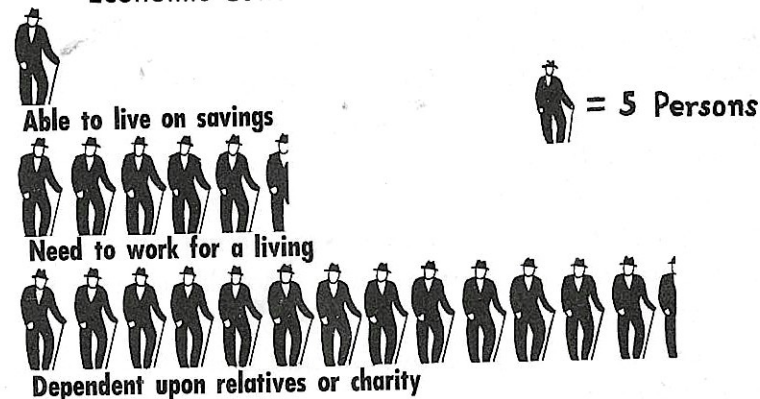
How long would each bar of the graph be?

6. How much did Roy spend for the show? For ice cream? For soda? For candy? For carfare?



How Roy Spent His Dollar

Economic Conditions of Older Persons



Unit Six

Spending and Saving

Studies have shown that of every 100 persons who become 65 years of age, 67 are dependent upon others for support, 28 are able to work and need to work for a living, and 5 are financially able to live on their savings.

No person wants to suffer or to depend upon others when he becomes old. Each of us wants enough saved so that he can enjoy some of the comforts and pleasures of life in old age. This can be done only by carefully planned spending and systematic saving. You should learn now about planned spending. No matter how small your earnings or allowance is, you should begin now to save a part of it. Habits formed now will help you when you have more to spend and to save.

Keeping a Personal Account

Any boy or girl who has an allowance or anyone who earns money ought to keep a personal account so he will know at the end of each month exactly how much money he has received, how much of it has been spent, and exactly how much he has left. Some money ought to be placed regularly each month in a savings account.

Here is a copy of two pages from Albert's personal account book.

Receipts				Expenditures			
May	1	Cash on hand	14 94	May	3	School lunches	3 00
	3	Allowance	5 00		8	Movie	50
	7	Sale of bicycle	15 00		10	Bicycle	25 00
	12	Mowing grass	50		12	Bicycle light	1 60
	18	Delivering groceries	75		15	Movie	50
	25	Contest prize	10 00		20	Soda	25
			0 0		28	Ball game	75
			0 0		29	Swim	50
			0 0			Put in savings account	10 00
			46 19			Balance	42 19
June	1	Cash on hand	4 09				
			0 0				

Where does Albert enter all money received? Money spent? How much money did he receive during May? How much did he spend? What was his balance? How did he find his balance? Why did he enter the balance as "cash on hand" for June?

Making Personal Accounts

In making the accounts below rule forms as in Albert's account book on the blackboard or on paper.

1. Make a personal account showing:

Receipts: Dec. 1, cash on hand, \$1.68; paper route, \$3; Dec. 8, paper route, \$3; Dec. 12, distribute handbills, 50¢; Dec. 15, paper route, \$3; Dec. 22, paper route, \$3; Dec. 25, present, \$2; Dec. 29, paper route, \$3.

Expenditures: Dec. 10, bicycle tire, \$2; notebook, 10¢; Dec. 15, Christmas cards, 30¢; Dec. 16, stamps, 10¢; Dec. 20, gift, \$3; savings account, \$2.50.

Balance the account on Jan. 1.

2. Make this account for Mr. Jones.

Receipts: Aug. 1, cash on hand, \$79.60; salary, \$50; Aug. 15, salary, \$30.

Expenditures: Aug. 1, electric bill, \$3.04; gas, \$2.15; telephone, \$3; water, \$1.25; Aug. 15, clothes, \$18.40; Aug. 16, car repair, \$6.80.

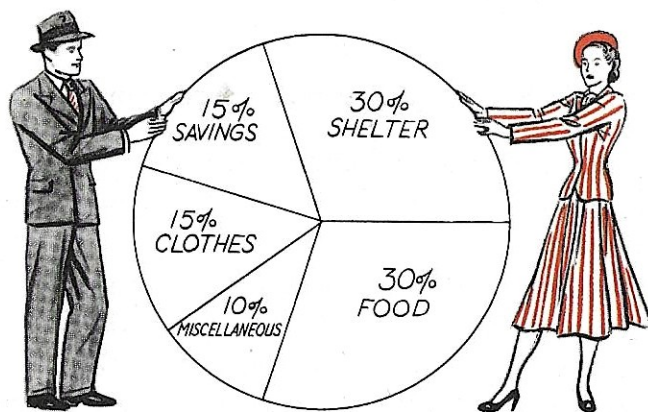
Balance the account on Sept. 1.

3. Make this account for Helen.

Money Received: Jan. 1, cash on hand, \$.78; washing windows, \$1.50; Jan. 5, ironing, 75¢.

Money Paid Out: Jan. 2, book, \$.59; Jan. 6, church entertainment, \$.35; bus fare, 20¢; Jan. 17, movie, \$.50; Jan. 25, birthday gift to sister, \$.50.

Balance the account on Feb. 1.



Family Budgets

There are many things a family must have to live comfortably. The principal expenses of the home are food, clothing, shelter, and overhead or operating expenses. Beside these necessities, there are other desirable things such as recreation, education, and savings.

In order to use the income to the best advantage, a family should plan how the income is to be spent, that is, a family should make a budget. A budget lists the amounts to be spent for various things. The amount that is necessary depends on the number in the family and the standard of living which the family maintains. The amount that can be spent depends on the family's income.

A family which manages the home in a business-like manner will keep an expense account. If the budget has been carefully made and the family has followed it, the account will correspond with the budget.

One family of five planned to use their money in this way.

<i>Shelter, include operating expense</i>	30%
<i>Food</i>	30%
<i>Clothing, include personal care</i>	15%
<i>Savings, include insurance and gifts</i>	15%
<i>Miscellaneous, include recreation</i>	10%

1. How many dollars will they have for each item if the family income is \$2000 a year? If the family income is \$2500 a year?

2. How much can they spend a week for food if the yearly income is \$2000? \$3000?

3. If they share their clothing allowance equally, how much can each member of the family spend a year for clothes when the yearly income is \$2000?

4. How much savings will there be per year when the yearly income is \$2000? \$3000?

5. What part of the savings do you think could be put in a savings bank, and what part used for insurance and gifts?

Planned spending is so important that classes are given in schools and colleges to help people get the most in goods and pleasure out of their income.

How the income can be divided best varies in different communities. It also depends upon the size of the family, and the amount of the income. If you had \$100 a month and only yourself to care for, how would you use it? If you had a family of five, how would you use it?

Planned Spending

Most persons do not have enough money and never will have enough to buy everything they want, not even to buy all the things they really ought to have. Planned spending helps one to get what he wants most and needs most. Unplanned spending leads to unwise buying and regrets.

Study these budgets:

1. Single person away from home (1937).

Weekly Income	Room & Board	Clothing	Savings	Other
\$15	\$8.00	\$2.50	\$1.50	\$3.00
20	8.75	3.50	3.50	4.25
25	9.00	4.00	6.00	6.00
30	9.00	4.00	8.00	9.00
40	10.00	5.00	15.00	10.00

2. Family of three.

Weekly Income	Food	Clothing	Shelter	Savings	Other
\$30	25%	15%	20%	10%	30%
40	20%	15%	18%	18%	29%
50	20%	15%	18%	20%	27%

3. Family of four.

\$30	27%	20%	20%	8%	25%
40	25%	20%	18%	12%	25%
50	20%	16%	20%	18%	26%

4. Family of five.

\$30	30%	22%	20%	5%	23%
40	28%	20%	25%	7%	20%
50	25%	18%	20%	12%	25%

Budget Problems

Use the budgets on page 144 for the problems below.

1. How many dollars should a family of three spend for food if the weekly income is \$30?

2. Copy the budgets for families of three, four, or five, substituting dollars and cents for percentages of income.

3. Mr. Cobb is married and has 1 child. He earns \$50 a week. Mrs. Cobb is ill. What items in the budget will be increased? If he pays the bills from savings, what items in the budget do you think he can cut later to restore the savings?

4. Mr. Cobb pays carfare from the "Other" allowance. He bought an automobile and has to pay \$6.25 a week for it. From what item or items will he get the money? Should he move into a cheaper home? Should he decrease the allowance for food? Should he cut down his savings and insurance? What would you do?

5. Mr. Scott has a wife and two children. He earns \$50 a week. Should he save as much as Mr. Cobb? Would it be better for him to put his savings in a bank, or use them to buy insurance?

6. Make a budget for a family of six with an income of \$50 a week.

7. When the income is not enough to meet all needs, which of these should be cut first or most: Food? Shelter? Clothes? Savings?

Monthly Budget for a Family of Five

Food	\$50.00
Shelter	40.00
Clothing	20.00
Operating (heat, light, etc.)	12.00
Savings and insurance	15.00
Education and recreation	10.00
Transportation	10.00
Miscellaneous	9.67

1. What is the sum of the items budgeted above? How much is this for one year?
2. Copy the budget above, using percentages instead of dollars and cents for each item.
3. If the family owned their home, how might the amount for shelter be changed?
4. If the man lived a great distance from his work to obtain lower rent, how might the cost of transportation be changed?
5. From what part would a doctor or dentist be paid?
6. Is \$15 enough for savings and insurance? How might this be increased?
7. How might the budget above be different in a small town? In a large city?
8. If the three children are sent to a private school with tuition charge of \$300, what changes would need be made in the budget?
9. The 15-year-old boy wants a 40-dollar bicycle. From what item should the money be taken?

10. Make a budget for a family of three with a yearly income of \$2400. The family wishes to use 8% of the income for the child's education.

11. The Brown family had a budget with only three headings:

Necessities	75%
Education and recreation	15%
Savings and insurance	10%

How many dollars can they use for each item when their yearly income is \$3000?

12. The Browns' yearly income increased from \$3000 to \$3600. They did not change the amount for necessities, education, and recreation. They saved the extra money for a home. What percentage of the new income did they use for necessities? For education and recreation?

13. Mr. Hall earns \$150 a month. He uses 20% for rent and 15% for clothing. How many dollars does he have for other things?

14. The White family live in a small town. Their income is \$150 a month. Suggest changes to improve this budget for them.

Food	20%
Shelter	25%
Clothing	15%
Operating costs	15%
Education and recreation	15%
Savings and insurance	6%
Other	4%

Shelter

The amount allowed for shelter will depend on whether the house is rented or owned.

1. What are the advantages of owning a home?
2. What are the advantages of renting a home?
3. What expenses should be included under housing if the family owns the home?
4. What is the total amount spent during one year for rent at \$37.50 per month?
5. A family owned a home and paid for these items during one year: insurance, \$86.00; interest, \$120.09; taxes, \$63.40; papering, \$26.75; and painting, \$34.60. What was the average monthly expense for housing?
6. A family owning a house having two apartments rented one for \$50.00 per month, and lived in the other. The year's expenses on the house included insurance, \$156.70; interest, \$360.00; taxes, \$108.00; repairs and upkeep, \$145.40. Did the rent from the other apartment take care of the housing expenses? What was the average monthly expenditure? How much more or less than one month's rent was this?
7. Mr. Harris bought a home and paid for it in monthly installments of \$89.50 which included interest and insurance. During one year he spent \$364.00 for improvements and \$156.00 for taxes. How much was his average monthly expense for housing?

Operating Expenses

1. Mr. May received these bills in one month:

Electricity	\$3.56	Telephone	\$4.98
Gas	3.16	Laundry	6.75
Water	1.00	Plumbing	2.50

Find the sum.

2. How can knowledge of the cost and economical use of gas and electricity help the home maker?
3. What can one do to heat the home at less cost?
4. How will the cost of laundry and dry cleaning vary with the ages of members of the family?
5. A 4-party telephone line costs \$4.98 a month, and a 2-party line costs \$6.44 a month. How much can one save a year with a 4-party line?
6. The Harris family used \$390.24 last year for operating expenses. What was the monthly average?
7. This year the Harris family used \$19.52 less for operating expenses than last year. What percentage of last year's expenses is the saving?
8. Next year the Harris family plan to keep their operating expenses $7\frac{1}{2}\%$ less than last year. How much will their operating expenses be next year?
9. Name some ways a family can save on operating expenses. What use should they make of the saving?

Food

1. Mrs. Taylor saved on food by using potatoes, dried beans, and spaghetti instead of meats, fresh fruits, and vegetables. What do you think of this means of saving?

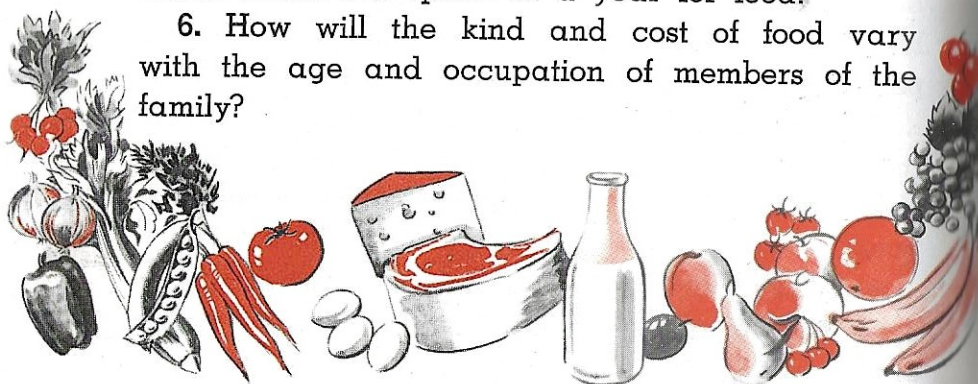
2. Mrs. Horton's food bill averaged \$13.50 a week. How much was this a day? A year?

3. During three summer months, Mrs. Horton spent 20% more for food than her budget allowed. The budget allowed \$61 a month. How much did she spend in the three months?

4. Mrs. Horton used the extra summer expense to buy fruits and vegetables for canning. Her home-canned foods allowed her to save 30% on food for three winter months. How much was the real saving because of the canning at home?

5. Mrs. Mill's food costs for three months were: \$46.58, \$51.25, and \$53.19. What was the average monthly expenditure? At this rate, how much would she spend in a year for food?

6. How will the kind and cost of food vary with the age and occupation of members of the family?



Clothing

1. The Hill family have an income of \$2400. They allow 15% of the income for clothing. How much do they allow for clothing per year?

2. The Hills divide their clothing allowance so that Mr. Hill gets $\frac{1}{4}$, Mrs. Hill gets $\frac{1}{4}$, and the remainder is divided equally among three small children. How many dollars does each member of the family get?

3. When a family must spend less for clothing, which plan should they follow: Buy cheaper clothes? Buy fewer clothes? Shop around and try to find good clothes for less?

4. Girls may save money on clothes by learning to sew. Ann wanted a blouse that cost \$2.95. She decided she could make one like it. The pattern cost 25¢. She also bought $1\frac{1}{2}$ yd. of white lawn at 78¢ a yard, a spool of thread for 5¢, and a card of buttons for 19¢. How much did she save by making the blouse?

5. Ruth wanted a new outfit for a skating party. The skirt she liked cost \$4.95, and the sweater cost \$3.98. Instead of buying these, she cut the skirt from an old dress, and bought a 100% wool sweater for \$2.95. If dry cleaning and remaking the skirt cost her 78¢, how much did she save by getting the second outfit?

6. For Boys Only: Do you think girls should study cooking and sewing in school?

Miscellaneous Budget Items

1. Education and recreation could include music and dancing lessons; books and magazines; swimming; shows; contributions to church and charity. There are three children in the Mason family. How will the education and recreation item vary as the children grow older?

2. Mr. Mill earns \$350 a month. They allow 10% of this for education and recreation. Can they afford to pay \$10 a month apiece for music lessons for their two children?

3. The Gray family have an income of \$320 a month and three small children. They own a small house. Mr. Gray drives to work in his own car. How much per month should the Gray family allow for: Life insurance? Tornado insurance? Fire insurance? Automobile insurance?

4. What percentage of a monthly income of \$200 must be saved in order to save \$540 in a year?

5. What amount may be used for charity each month if the yearly income is \$1800 and 8% of this is allowed for charity?

6. Mr. Johnson gave \$15 to the Community Chest last year. His income was \$3000. What percentage of his income did he give to the Community Chest?

7. Mr. Johnson gives 5% of his income to church work. How much is this a month?

Keeping a Record of Food Expenditures

In order to profit most from a budget, one must keep an accurate record of expenditures. A record should be made each day of the money spent that day. The account for each item of the budget may be kept on a separate page. The money spent for food in one month is shown below.

Compare the amount actually spent for food with the amount available for the month.

Food for March

Amount allowed per month		\$60.00
Balance from preceding month		2.90
Total available for month		\$62.90
Date	Goods Bought	Cost
1.	Fruit	\$1.45
2.	Meat	4.25
3.	Dry milk and oleo	1.09
	Groceries	4.82
6.	Fruit	1.50
8.	Chicken	5.25
9.	Groceries	5.90
10.	Meat	3.90
12.	Groceries	6.80
15.	Dry milk and oleo	1.09
16.	Fruit	1.65
18.	Meat	4.45
20.	Groceries	8.72
27.	Dry milk and oleo	2.18
30.	Groceries	4.43

One Account for All Spending

Some people prefer to keep all their expenditures in one account rather than to have a separate account for each item of the budget. Discuss the advantages and disadvantages of this sort of account.

Find the total of the expenditures below.

Date	Expenditure	Amount
Nov. 1	Rent	\$40.00
Nov. 3	Groceries	9.58
Nov. 4	Clothing	10.75
Nov. 5	Concert	1.00
Nov. 7	Groceries	6.80
Nov. 8	Dentist	4.00
Nov. 8	Book	.25
Nov. 10	Electricity	3.42
	Water	1.75
Nov. 12	Laundry	4.85
Nov. 13	Movies	1.20
Nov. 14	Groceries	11.14
Nov. 15	Insurance (for quarter)	24.15
Nov. 17	Dry cleaning	3.00
Nov. 20	Groceries	5.55
Nov. 25	Milk	5.25
Nov. 26	Groceries	6.72
Nov. 28	Laundry	3.00
Nov. 29	Medicine	1.25
Nov. 30	Groceries	8.10
Nov. 30	Gasoline for month	12.00

Using a Single Account

1. Refer to page 154 and find the total spent for food, clothing, recreation, health, personal care, household, insurance, transportation.

2. Are there any expenses in November that might not occur each month? Name them.

3. Keep an accurate account of your family expenses for one week. Are these expenditures in keeping with a carefully planned budget?

4. Mr. Smith became ill suddenly. The expenses were:

Doctor's house call	\$5.00
Surgeon's fee	250.00
Use of operating room	20.00
Anesthetic	15.00
Hospital room for 2 weeks	112.00
3 nurses for 2 days	76.00

What were the total expenses?

5. Mr. Smith had insurance that paid for the use of the operating room, the anesthetic, and \$7.00 a day for the cost of the hospital room. How much did the insurance company pay? How much did the illness cost Mr. Smith?

6. Mrs. Smith had an emergency fund in which she placed \$10 each month. She had done this for 4 years and had not previously used any of the money. Was there enough money in this fund to pay for Mr. Smith's illness (taking account of what the insurance company paid)?

Mixed Practice

You cannot keep a budget or an account accurately if you make mistakes in arithmetic. The practice below will help you to be accurate. Work with a partner. Check after each example.

1. Add: 561, 2,309, 45, 24,300, 7, 376.
2. $\$45.26 + \$9.7 + \$0.05 + \$254.90 + \$5.00 =$
3. $1\frac{3}{4}$ yd. $+ 4\frac{1}{3}$ yd. $+ 1\frac{5}{6}$ yd. $=$
4. $34.21 + .56 + 234.05 + 500 + .32 =$
5. Find the average of
.125, 4.250, 222.545, 420, 34.592.
6. Subtract 45 from 9000.
7. Subtract .075 from 5.327.
8. What must be added to 3200 ft. to make a mile, or 5,280 ft.?
9. $45,680 - 258 =$
10. Take $5\frac{3}{8}$ from $14\frac{1}{3}$.
11. Multiply 2005 by 302.
12. $1,495 \times 3.5$
13. Find .987 times 45.38.
14. $\frac{1}{3} \times 4\frac{1}{2}$
15. Find $\frac{1}{5}$ of \$35.60.
16. 280 is what part of 630?
17. Divide 40800 by 5.
18. $.4641 \div .51$
19. $24011 \div 69$
20. 11.3 divided by 24

Those who need additional mixed practice should work on page 340.

Can You Hit a Homer?

Mark papers at the end of each section.

Section I. Add. First Base

1. $\frac{1}{2} + \frac{1}{6} + \frac{2}{3} + \frac{5}{8} = 12\frac{1}{2} + 8\frac{1}{3} + 5\frac{1}{4}$
 $\frac{3}{4} + \frac{2}{3} + \frac{2}{5} + \frac{1}{3} = 6\frac{1}{4} + 3\frac{1}{6} + 2\frac{1}{6}$
2. $\frac{1}{3} + \frac{3}{4} + \frac{4}{5} + \frac{5}{6} = 3\frac{1}{3} + 6\frac{2}{3} + 1\frac{5}{6}$
 $\frac{5}{6} + \frac{1}{3} + \frac{1}{2} + \frac{1}{4} = 2\frac{3}{4} + 3\frac{7}{8} + 4\frac{3}{8}$

Section II. Subtract. Second Base

3. $\frac{7}{8} - \frac{3}{4} = \frac{7}{8} - \frac{5}{8} = \frac{2}{8} = \frac{1}{4}$
 $\frac{1}{8} - \frac{1}{2} = \frac{1}{8} - \frac{4}{8} = -\frac{3}{8}$
4. $\frac{5}{6} - \frac{7}{8} = \frac{10}{12} - \frac{11}{12} = -\frac{1}{12}$
 $\frac{1}{6} - \frac{2}{3} = \frac{1}{6} - \frac{4}{6} = -\frac{3}{6} = -\frac{1}{2}$

Section III. Multiply. Third Base

5. $\frac{3}{8}$ by $\frac{2}{3} = \frac{6}{24} = \frac{1}{4}$
 $\frac{5}{6}$ by $\frac{4}{5} = \frac{20}{30} = \frac{2}{3}$
 $3\frac{1}{2}$ by $\frac{2}{3} = 6\frac{1}{3}$
 $2\frac{2}{3}$ by $1\frac{7}{8} = 4\frac{11}{12}$
6. $\frac{3}{5} \times \frac{5}{6} = \frac{15}{30} = \frac{1}{2}$
 $\frac{2}{3} \times \frac{3}{4} = \frac{6}{12} = \frac{1}{2}$
 $16\frac{2}{3} \times \frac{1}{2} = 8\frac{1}{3}$
 $3 \times 8\frac{1}{3} = 25\frac{1}{3}$
7. $\frac{5}{8}$ by $\frac{1}{2} = \frac{5}{16}$
 $\frac{4}{5}$ by $\frac{1}{3} = \frac{4}{15}$
 $7\frac{1}{2}$ by $\frac{2}{3} = 10$
 8 by $6\frac{1}{4} = 48\frac{1}{2}$
8. $\frac{3}{8} \times \frac{5}{6} = \frac{15}{48} = \frac{5}{16}$
 $\frac{11}{12} \times \frac{2}{3} = \frac{22}{36} = \frac{11}{18}$
 $18\frac{3}{4} \times \frac{5}{6} = 15\frac{15}{8} = 19\frac{3}{8}$
 $3\frac{1}{3} \times 12 = 40$

Section IV. Divide. Home Run

9. $\frac{2}{3} \div 2 = \frac{2}{3} \times \frac{1}{2} = \frac{1}{3}$
 $\frac{7}{8} \div \frac{1}{2} = \frac{7}{8} \times \frac{2}{1} = \frac{7}{4} = 1\frac{3}{4}$
 $3\frac{1}{3} \div \frac{1}{3} = 10$
 $18\frac{3}{4} \div 3 = 6\frac{1}{4}$
10. $\frac{5}{6} \div \frac{2}{3} = \frac{5}{6} \times \frac{3}{2} = \frac{15}{12} = 1\frac{1}{4}$
 $\frac{3}{4} \div \frac{1}{4} = \frac{3}{4} \times \frac{4}{1} = 3$
 $7\frac{1}{2} \div 1\frac{1}{4} = 6$
 $8\frac{1}{3} \div 2\frac{2}{3} = 2$
11. $\frac{1}{4} \div \frac{1}{2} = \frac{1}{4} \times \frac{2}{1} = \frac{1}{2}$
 $\frac{1}{2} \div \frac{1}{4} = \frac{1}{2} \times \frac{4}{1} = 2$
 $2\frac{1}{2} \div 5 = \frac{5}{10} = \frac{1}{2}$
 $5 \div 3\frac{3}{4} = \frac{20}{15} = \frac{4}{3} = 1\frac{1}{3}$
12. $100 \div 33\frac{1}{3} = 3$
 $100 \div 6\frac{1}{4} = 16$
 $100 \div 16\frac{2}{3} = 6$
 $100 \div 7\frac{1}{2} = 13\frac{1}{3}$

Developing Power in Problem Solving

Tell what facts are needed to solve each problem and what process to use. Do not solve the problems now.

1. The grocer sells rice in half pound packages. How much does the rice cost per pound?

2. If three pieces of ribbon are sewed together, allowing 2 in. for the seams, how long would the whole piece be? Draw a picture to help you.

3. Mother gave Ellen some apples. Ellen ate one and cooked some others. How many apples were left?

4. What is the cost of a dozen oranges, a pound of ground beef, and a peck of potatoes?

5. How many dozen buttons will Mary need for her new dress?

6. What is the cost of enough packages of dog biscuits to feed Mutt for a month?

7. Mother divided a box of apples so the apples would last 10 days. How many apples did she use each day?

8. Jane eats the same number of apples each day. How many days will it take her to eat a bag of apples?

Supply a sensible value for each missing fact above, and solve the problems.

Difficult numbers may make a problem seem harder than it really is. In such a case, you may make up a problem like the given problem except with simple numbers. The solving of the easy problem will give you a pattern you can use in solving the more difficult problem.

9. How many pieces of ribbon each $2\frac{5}{8}$ in. long can be cut from a piece of ribbon $5\frac{1}{4}$ ft. long?

Same problem with easy numbers: $5 \times 12 = 60$

How many pieces of ribbon each 3 in. long can be cut from a piece of ribbon 5 feet long? $60 \div 3 = 20$

10. If $6\frac{1}{4}$ yd. of material is enough to make $2\frac{1}{2}$ draperies, how many yards of material will make 8 draperies?

Same problem with easy numbers:

If 6 yd. of material will make 2 draperies, how many yards of material will make 8 draperies?

11. John plowed $1\frac{3}{4}$ acres in $2\frac{1}{2}$ days. How many acres can he plow in $3\frac{1}{3}$ days?

Same problem with easy numbers:

John plowed 6 acres in 2 days. How many acres can he plow in 5 days?

12. A can of evaporated milk weighs $14\frac{1}{2}$ ounces. How many cans will 580 pounds of evaporated milk fill?

13. Mother bought a turkey weighing $15\frac{1}{4}$ lb. for \$10.98. What did the turkey cost per pound?

Races with Whole Numbers

Choose a partner. Work as rapidly as you can, but do not forget that right answers are of first importance. Check after each race. The first finished is the winner if he has the larger number of right answers.

Race One. Add.

1.	6	12	49	46	602	572	73
	4	81	16	10	250	35	98
	2	15	62	5	547	21	300
	0	23	50	88	357	907	791
	4	19	78	24	573	53	911
	7	64	69	8	721	324	635
	9	42	54	90	390	20	6

Race Two. Subtract.

2.	752	1732	31416	223,607	250,400
	410	685	8308	192,354	169,706
3.	141	2236	28284	290,517	310,805
	68	1732	6324	93,808	141,067

Race Three. Multiply.

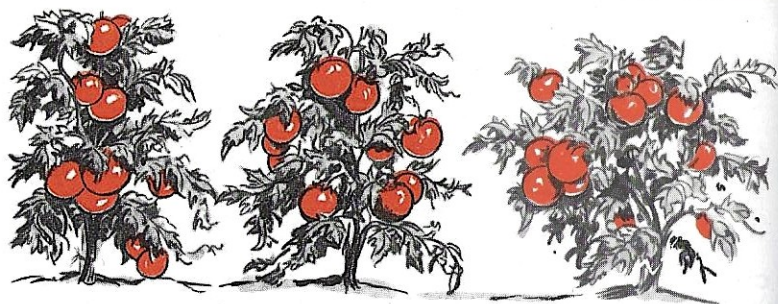
4.	28	63	75	93	418	748	324
	4	6	7	8	5	6	7
5.	39	76	84	47	365	807	976
	43	91	65	28	59	74	85

Race Four. Divide.

6.	6)478	8)573	9)298	5)392	7)448	4)352
7.	32)3863	47)3449	83)7778	66)2046	29)8043	

Shopping without a Pencil

- At 2 for 11¢, what will 12 bars of soap cost?
- Tomatoes cost 14¢ a can. How many cans can I buy for 70¢?
- What is the cost of $\frac{1}{4}$ lb. of cheese at 59¢ a pound?
- Which is cheaper: Klenso at 3 cans for 25¢, or at 4 cans for 33¢?
- A jar holds $1\frac{1}{2}$ lb. of sirup. How many pounds of sirup are in the jar when it is $\frac{2}{3}$ full?
- The total food bill for the week was \$12. Of this, \$3 was spent for butter and milk. What per cent of the total was used for butter and milk?
- A family with income of \$1800 a year should not use more than 30% for rent. What is the highest monthly rent such a family can afford?
- Mrs. West bought eggs at a sale for 35¢ a dozen. An average of 5 eggs per dozen was unfit for use. How much did she really pay for each good egg? How much was this per dozen?
- A live chicken loses about $\frac{1}{3}$ of its weight when it is dressed. Is it cheaper to buy a live chicken at 36¢ a pound or a dressed chicken at 50¢ a pound?
- A remnant of $\frac{3}{4}$ yd. of velvet is marked \$1.80. At this rate, what is the price of a yard?
- Mrs. Jones paid 70¢ for 14 oz. of butter. What is the price of a pound of butter?



Planning a Garden

1. Ted has a garden 12' by 18'. He has read that tomato plants should be from $2\frac{1}{2}'$ to 3' apart each way. Try to discover a way by which Ted can find the number of tomato plants he can put in his garden.

2. What is the area in square feet of the garden?

3. What is the approximate area in square feet that one plant uses? ($2\frac{1}{2} \times 3$ sq. ft.)

4. Try to use the answers to Problems 2 and 3 to find the answer to Problem 1.

5. Use the scale, $1''=2'$, and make a drawing of Ted's garden showing where you would put each plant. Do not have any plant nearer than 1' to an edge of the garden.

An experimental garden raised a number of varieties of tomatoes and found the number of pounds of fruit per plant for different varieties.

Break O'Day	12.5 lb.	Belmont	6.4 lb.
Oxheart	9.9	Pritchard	6.2
Early Baltimore	7.4	Victor	5.4
Ponderosa	6.8	Marglobe	5.2
Earliana	6.6	Rutgers	4.9

6. Ted has 30 Break O'Day plants. If they bear as shown in the table, how many pounds of tomatoes will he have? At 60 lb. to the bushel, how many bushels will this be?

7. At $6\frac{2}{3}\text{¢}$ a pound how much can Ted get for the tomatoes he hopes to raise?

8. If his tomatoes average 5 oz. each, how many will there be on a plant?

9. If the tomatoes average 8 oz. each, how many will there be on a plant?

10. About how many tomatoes are in a bushel, if they average 5 oz. each? 8 oz. each?

11. Three pounds of fresh tomatoes make a quart of canned tomatoes. How many tomatoes are needed for a quart of canned ones if the fresh tomatoes average 5 oz. each? 8 oz. each?

12. Oxheart tomatoes often weigh 2 lb. each. How many of such tomatoes are in a bushel?

13. Ponderosa tomatoes often weigh 24 oz. each. How many of these tomatoes are in a bushel?

14. How many of the large Ponderosa tomatoes would it take to make 1 qt. of canned tomatoes?

15. Ted read that depending upon soil and weather conditions other varieties often bore better or were more desirable than Break O'Day. If Ted had chosen Marglobe, how many pounds could he have expected?

16. What percentage is this of what he had expected from Break O'Day?

Home Problems

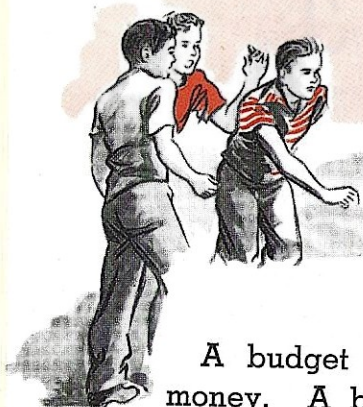
1. It takes $\frac{5}{8}$ yd. of material to make an apron. How many yards should Alice buy for 3 aprons?
2. Billy is making shelves for storing canned fruit. Each shelf is $3\frac{1}{3}$ ft. long. How many feet of lumber are needed for 6 shelves? What is the cost at \$.45 a running foot?
3. Billy painted the basement stairs. He bought 2 qt. of paint at \$1.49 a quart, and used 3 pt. of it. What was the cost of the paint he used?
4. Connie used $5\frac{1}{3}$ yd. of gingham to make 4 aprons. How much was this for 1 apron?
5. Mother bought a kitchen table marked \$35 and 4 chairs marked \$7.95 each at a discount of 20% from the marked price. How much did she pay for the table and chairs?
6. Shoes are marked \$10.50 a pair. Mrs. Gates bought three pairs at a discount of 30% from the marked price. What was the total cost?
7. Mr. Thomas saves \$200 a year. This is $4\frac{1}{6}\%$ of his yearly salary. What is his monthly salary?
8. At 27¢ a half pint, what is the cost of 2 qt. of whipping cream?
9. Find the cost of $5\frac{3}{4}$ lb. of roast at 96¢ a pound.
10. The Masons have an income of \$5000 a year. What percentage must they save in order to save \$1000 in five years?



Your Turn at Bat

1. The income is \$240 a month. How many dollars a month would be used for each item?

Shelter and operating	30%
Food	20%
Clothing	15%
Savings and insurance	10%
Education and recreation	10%
Miscellaneous	15%
 2. Change each percentage in Problem 1 to a common fraction. Use these to find how many dollars a month would be used for each item when the income is \$300 a month.
 3. James has an allowance of \$2. This is the way he used it: Sunday school, 20¢; picture show, 35¢; ice cream, 10¢; tennis ball, 40¢; candy, 10¢; ball game, 75¢; dime bank, 10¢. What percentage of his allowance did he use for each item?
 4. Later James had an income of \$3.00 a week. If he used the percentages found in Problem 3, how much would he use for each item?
- If you think you understand budgets and accounts, work on page 167. If you think you need more budget practice, work on page 166.



Base Coaching

A budget is a plan for the wise spending of money. A budget may be made to fit a person, a family, or a large group. Schools and governments employ experts to make their budgets.

The family budget below is a sample.

Shelter	20%
Operating expenses	15%
Food	25%
Clothing and personal care	15%
Education and recreation	8%
Savings and insurance	10%
Miscellaneous and emergency	7%

1. Show the budget above in a bar graph.
2. The Taylor family have an income of \$2000 a year. How many dollars would they use for each item in the budget above?
3. Make a list of all the things for which a family must spend money. Group these into about eight groups.
4. The Boone family have an income of \$5600 a year. They want to save \$800 a year. What percentage of their income must they save?



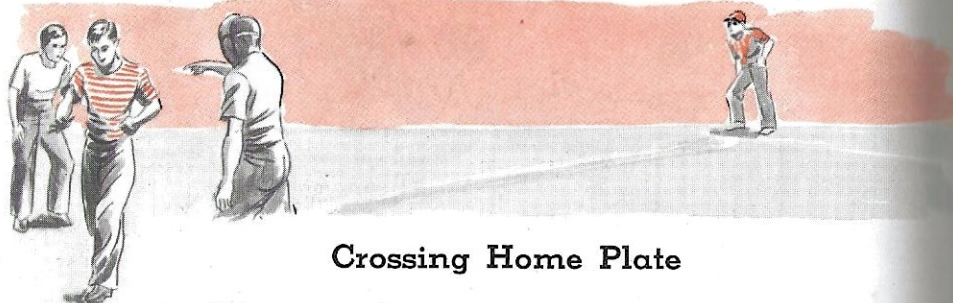
Stealing Bases

Those who steal bases well and get things done on time have a time budget. Time budgets allow the proper amount of time for work, for recreation, and for rest.

This is Jane's time budget. Do you like it?

Time	What to Do
7:00 a.m.	Get up and dress
7:30	Eat breakfast and do dishes
8:15	Leave for school
9:00	In seat at school
3:30 p.m.	Scouts, club, play, study
4:45	Go to store
5:15	Music, mend, wash own clothes, help
6:00	Eat
6:45	Study
8:00	Radio, books, visit with friends
9:00	Personal care
9:30	To bed

1. Make a budget of your time as you are spending it.
2. Make a budget of your time as you ought to be spending it.
3. Which items will get more time on Saturdays and Sundays?



Crossing Home Plate

1. What is a budget?
 2. What are the important items that must be included in a family budget?
 3. What is a reasonable percentage of income that can be used for food? For shelter? For recreation?
 4. Mr. Davis made this budget. Did Mr. Davis include all important headings? Name one that is not included. Do you think the income is distributed to be best for the family?
- | | |
|-----------------------|-----|
| Shelter | 25% |
| Insurance | 15% |
| Savings | 10% |
| Pleasure | 5% |
| Children's allowances | 5% |
| Emergency | 15% |
5. Does Mr. Davis' budget take account of his whole income? Give reason for your answer.
 6. Jimmy's account book showed that he had a total income for the month of \$5.25, and that he spent \$4.18. He had \$1.03 in cash at the end of the month. Could his account be accurate?
 7. An ornament sold for 29¢ before Christmas and for 7¢ after Christmas. Find the discount correct to the nearest tenth of a per cent.
 8. At 6 for 49¢, how many cans of milk can you buy for \$3? How much change will you get?

TO BE
CONTINUED

